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The Environmental Impact of Farm Support Policies in Ontario

One of a series of Research Papers prepared for the Policy
Committee of the Ontario Round Table on Environment
and Economy



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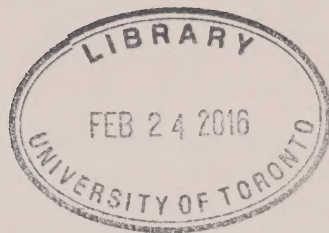
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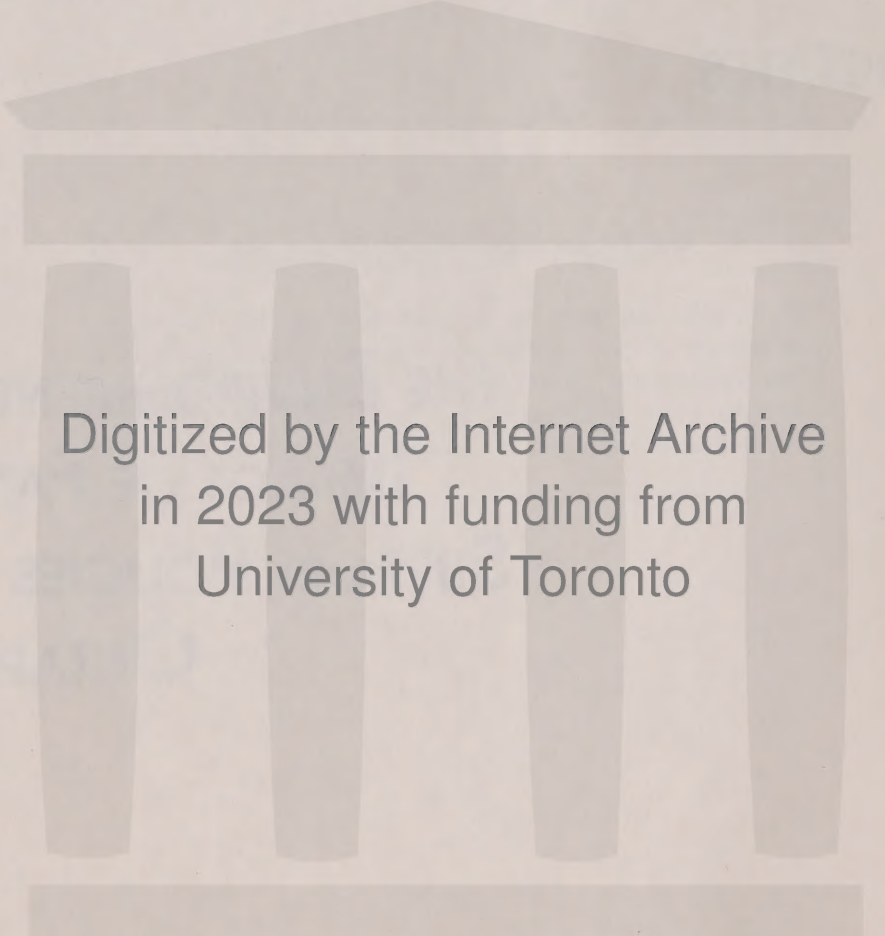
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ASSOCIATES



THE ENVIRONMENTAL IMPACT OF FARM SUPPORT POLICIES IN ONTARIO

**REPORT TO THE POLICY COMMITTEE,
ONTARIO ROUND TABLE ON
ENVIRONMENT AND ECONOMY
JANUARY, 1992**



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PREFACE

The Ontario Round Table on Environment and Economy was established to foster and promote sustainable development. The Round Table chose to do this by developing a sustainable development strategy for the province through a process of consultation and consensus building. The Strategy addresses our ability to protect the quality of the environment while promoting economic prosperity. Today's goal, sustainable development, goes a step beyond yesterday's environmental protection. The latter approach, a product of the 1970's, addresses the effects of environmental pollution after they have occurred. It can be characterized by "command and control" regulations of considerable detail, often to effectively specifying which kind of technology must be used.

Sustainable development, on the other hand, starts from the assumption that environmental protection and economic development must proceed hand in hand. To truly protect the environment for future generations economic decisionmakers will have to anticipate the environmental consequences of their actions before they occur, and adopt greater energy efficiency, and cleaner and less wasteful industrial processes. Ontario will need to measure its progress toward sustainable development by developing indicators which integrate environmental, social and economic data and to report regularly on those indicators and the sustainability of individual sectors.

Much has been written about the "globalization" of the Ontario economy. We are now beginning to witness the "globalization" of our environmental policies as external forces such as climate change, ozone holes and free trade agreements begin to influence our domestic decision-making. As Ontario restructures to meet the challenge of competitiveness, how can we restructure to be more environmentally sustainable at the same time? Michael Porter has written that the most competitive companies are often those which come from the markets whose standards are the highest. He points out that a number of countries, Germany and Japan among them, are deliberately using strict environmental and energy conservation standards to encourage innovation in their industrial sectors.

To provide a foundation for the sustainable development strategy, the Round Table has identified six guiding principles which have become the cornerstones of successful environment-economy links: Anticipation and prevention; Full cost accounting; Informed decision-making; Living off the interest; Quality over quantity; and, Respect for nature and the rights of future generations. To further the development and implementation of these principles within the final Strategy, the Policy Committee of the Ontario Round Table on Environment and Economy has commissioned a series of papers and workshops (a complete listing of these projects follows this preface).

Unlike Sectoral Task Forces of the Round Table which studied the sustainability of particular sectors of the provincial economy, such as agriculture, forestry or urban development, the Policy Committee has a broader mandate to examine cross-sectoral, policy issues and their effects on the environment and sustainability.

First, to know whether a change towards sustainable development is necessary, we must know the cost of environmental degradation under the status quo. How much is Ontario paying to rectify past damage to the environment and what is the hidden value of the natural endowment that Ontario has lost through economic development? Is the cost high enough to justify implementing new means of sustainable economic growth with all the associated transition costs? Two papers begin to address this formidable preliminary step. One, "The Economic Cost of Environmental Damage in Ontario", attempts to develop a methodology to quantify the cost of all natural degradation, direct and indirect, resulting from human activities. The second, "The Environmental Impact of Farm Support Policies in Ontario", examines the ecological cost of perverse subsidies - those which provide a direct economic benefit to the recipient while at the same time causing an indirect and unintentional environmental cost - to Ontario's agriculture industry.

Second, what changes to structure or policy choices are necessary to minimize the costs of environmental damage? The implications of this question are too broad to address fully. Two papers examine limited aspects of change. "Opportunities and Economic Instruments" looks at ways in which the traditional command and control method of pollution regulation can be improved in favour of marketplace-driven incentives to cleaner industry. "Alternative Dispute Resolution Mechanisms for Ontario" looks at disputes arising in the environment-economy context and suggests methods for their resolution as an alternative to the court system. Policy changes in both of these realms would arguably provide faster, less costly and a more "hands-on" means of regulating pollution and resolving the conflicts that result from government regulation.

Third, how can we insure that public and private decision-makers have the information necessary to make the right policy choices? The Policy Committee sponsored two workshops on the collection and reporting of environmental information. The first addressed the private sector, and a proposed change in corporate reporting requirements to include information on a company's progress toward sustainable development. The workshop, co-sponsored with the Ontario Securities Commission, concluded that the financial markets would need such information if capital is to be directed toward more sustainable activities. The second addressed the public sector and whether Ontario should adopt an environmental information reporting system similar to current reporting of economic information. If such reporting is to take place, by what does one measure environmental well-being? Indicators, or units of measurement for environmental reporting, were studied in, "Reporting on Sustainability: Human Well-Being within Ecosystem Well-Being".

And finally, how can Ontario achieve sustainability while remaining both profitable and competitive? "Integrating Sustainable Development into Workplace Governance" explores the implementation of sustainable development not just from management down, but also from the workforce up. And a workshop on Economic Restructuring for Environmental Sustainability examined what Ontario's industry must do to remain competitive in the face of global markets.

These papers and workshop highlights have been published under their own auspices, yet many of their conclusions have also been important in developing the Sustainable Development Strategy. They have helped to provide the vision necessary to keep Ontario's future abreast of changing priorities and to keep our environment and the economy improving together.

Although the papers have been reviewed by members of the policy Committee, they have not been endorsed by either the Committee or the Round Table. The opinions expressed in them are therefore those of the authors alone.

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Note that all the data used to derive these graphs are drawn from publicly available statistical series, including census materials, of Statistics Canada. A relatively large number of series were used, exact sources are available on request from the author.

Executive summary

1. Agricultural policies were broadened and strengthened in Canada during the 1960's and 1970's in order to promote a fair return for farmers. This was to provide them with a measure of income security against short term variations in yields, caused by natural factors, such as droughts, frosts and excessive rains, and declines in market prices. The subsequent and unexpectedly large declines in commodity prices, rapid convergence of commodity prices and input costs, and increases in real interest rates have resulted not only in financial stress for farmers, but in an unexpectedly high level of public expenditures directly supporting farm incomes in Ontario and throughout Canada. The result has been that transfer payments and payments from publicly-subsidized yield and price insurance schemes now account for almost 50 percent of net farm cash incomes. In addition, the income enhancing effect of input subsidies realized through tax concessions and marketing arrangements (supply management) have a similar income effect to the direct government payments of recent years.
2. Some of this support is provided to farmers in a way that it is rewarding them financially for some of the very practices that are causing or exacerbating the sector's environmental problems; rather than assisting to address them by favouring better alternatives.
3. A sustainable pattern of agricultural production would exist when:
 - a. Farmers' concerns regarding markets, capital investment and debt can be addressed by providing reasonable returns to their labour and investment, while at the same time:
 - b. They would ameliorate the environmental considerations listed above through:
 - the use of rotations, cover crops, companion plantings and cover crops on lands of sufficient soil quality and low susceptibility to erosion to protect soils and water with:
 - the maximum use of nutrient recycling, naturally occurring production of nutrients, energy and systems of pest control,
 - the minimum use of non-renewable energy and pollution from plant and animal wastes, and so as to:
 - maximize the compatibility of agriculture with the achievement of objectives for wildlife, natural areas, flora and genetic diversity.
4. A farming policy that would support these types of changes could not rely predominantly, as present policies largely do, on the maximization of farm incomes and product sales through economies of specialized production of a limited range of commodities. These

economies would need to be supplemented with economies of complementary environmental relationships. It must be pointed out at this stage that farmers themselves, having always been dependent on and appreciated such complementary economies. They require a shift in the practice as opposed to rhetoric of government and in the setting of the management priorities of the sector as a whole. The issue is one of creating an economic framework for farming which reflects the complementary relationships more directly and completely.

5. Recent technologies, as well as economic trends and the policies and programs of both senior levels of government have all worked together to set Ontario's farm sector off on a path of change quite different from that outlined in para. #3. In recent decades the land base remaining in farming has become smaller, but the area intensively used has not declined very significantly. Furthermore, the amount of chemicals and other inputs has been increasing, as well as the amount of food output. More is being gained from less natural resources, but not without considerable risk of over stressing the environment.
6. Existing policies have the following detrimental effects on the environment:
 - a. Farmers already in crop insurance and gross revenue stabilization programs are discouraged from changing from relatively high input and intensive revenue generating production systems to ones relying on lower inputs and more rotations.
 - b. Present income stabilization programs based on commodities and total levels of production amplify the impact of declines in market prices and the negative effects of weather events on yields if farmers move to reduce the intensity of their production compared to conventional production practices.
 - c. Current programs tend to provide decreased levels of income security when yields may be less variable, under less intensive and more environmentally benign production practices, compared to more intensive production systems. They also discourage farmers from producing non-marketed crops such as forages and green manures, and encourage a more intensive use per hectare of inputs such as fertilizers and pesticides than would otherwise be the case.
 - d. Subsidizing such inputs as fertilizers and pesticides through sales tax concessions not generally available to industry also encourages more intensive cultivation and the greater use of potentially environmentally damaging inputs. It is more desirable to offer farmers income support through programs directly stabilizing incomes than through reductions in the prices of energy-based inputs.
 - e. It may be advantageous to consider ways of reducing the costs of land relative to commodity prices. This would encourage the increased adoption of low tillage forms of crop production – lower tillage not only would reduce energy consumption, but reduce

risks of soil and water degradation.

- f. Other conclusions on the effects of policies are implied in the recommendations that immediately follow.

7. Recommendations:

- a. Introducing a non-commodity based program to stabilize net farm incomes or returns to replace the existing forms of commodity specific programs would provide equivalent levels of income protection for conservation practices as existing programs, based on commodities, provide for traditional practices. How the total public and private costs of stabilization programs would be affected by a move to a non-commodity basis is beyond the scope of this report. However, it should quickly be investigated using a full cost accounting approach.
- b. The key concern in order to maintain the economic attractiveness of reduced tillage practices, would seem to be to avoid a repeat of the situation of the early 1980's when commodity prices were high both absolutely and in relative terms compared to energy-based prices. Ensuring a higher real price for energy-based inputs may be a sufficient answer, but thought must be given to offsetting the negative impact of a considerable improvement in commodity prices from today's extremely depressed levels.

One method could be to introduce cross-compliance requirements into farm income support programs, requiring farmers to use low tillage methods. Another option would be to encourage the evolution of farm structures such that an operator's labour becomes the constraint determining farm operations. Some options which come to mind, not all of which are necessarily equitable, efficient or socially acceptable in today's circumstances, include:

- policies and programs to reduce the cost of additional land for farm production,
 - to tax farm income on a fixed, rather than increasing, percentage basis,
 - to regulate the sale of energy-based inputs, perhaps requiring them to be available only to farmers holding marketable purchase quotas originally issued free to farmers by the Province.
- c. The adoption of reduced tillage will also be encouraged by a growth in farm size. This is already occurring, but the Province should investigate whether this trend is being constrained by the current economic conditions, and by land prices in particular. There may be a case here for offering reduced rates of interest for credit used to set up larger farms using reduced tillage methods. It may also be possible to link this cheaper credit to the provision of other environmentally desirable practices, such as the provision of habitat for wildlife.

- d. If it were decided to end tax concessions on their energy-based purchases, farmers could be provided with the same level of income support through a transfer of the revenues involved to cover premiums on a comprehensive income stabilization insurance program.
- e. The Province should conduct a careful and comprehensive review of supply management systems which includes environmental considerations.
- f. There is a need to deliver all farm programs according to ecological as well as market requirements. Improved standards for farm planning and evidence that farmers are managing their land use in an environmentally sensitive manner should be an important criteria to be eligible for a whole range of programs.
- g. The Province's farmers have already shown a very positive response to pesticide management training programs designed for farmers, and this experience should lead the Province to maintain the momentum by offering similar programs for the management of soil and water, and habitat resources. A number of other public and private agencies could be co-opted for this initiative, such as the Ontario ministry of Natural Resources for forestry holdings on farms and for wildlife habitat, and such agencies as the Ontario Federation of Anglers and Hunters and Ducks Unlimited.
- h. Should such educational programs prove successful, the Province would have strong grounds for insisting on adherence to environmental guidelines as a condition for eligibility in all programs. It would not be necessary for the Government to write the guidelines independently. They would be more effective if they were written by representative farmers in consultation with academics, representatives of other interests in the countryside as well as governments. Since these guidelines would have to be sensitive to local conditions, they would require considerable local input. The Province should build upon the apparently successful experience of using farmers through Soil and Crop Improvement Associations to deliver the Land Stewardship Programs, and promote the continued development and participation of such groups in initiatives to improve the standards of management of the environment.
- i. A new set of objectives are required to guide the setting of federal and provincial policies and programs for Ontario's farm sector. The various policy review consultative exercises initiated by the Federal Department of Agriculture can form the basis of many of the changes that are required.

Earlier this year the Ontario Ministry of Agriculture and Food established an Environmental Responsibility Team. Although its report stresses the need to involve stakeholders in all facets of OMAF's work, the participation of non-agricultural stakeholders appears to be

limited to that which will flow through inter-departmental meetings of senior officials. This seems inadequate if a spirit of cooperation between all stakeholders over natural resources is to be promoted. The management of natural resources is not something that can be implemented centrally – the mixes of issues are geographically very volatile, and some decentralized, multi-stake holder consultative and delivery process must be developed.

The new programs being considered by OMAF, such as those under 'Project Green Farm', tend to be incremental, subsidy and research/promotion exercises, and proposals for adjusting existing policies and the development of economic development strategies for the sector with environmental concerns as an equal consideration to support for marketing and farm income seems to lack any conviction and direction.

The Province should review its priorities in the light not only of this report, but the conclusions of many of the working groups set up under the Policy Review initiated by the Federal Minister of Agriculture.

- k. The Province needs to develop a system to monitor the impact of farming on the environment, covering all the facets of the issue as discussed in this report.

Chapter one

Introduction

This study was commissioned by the Ontario Round Table on Environment and Economy to:

1. Identify the present and future impact of Ontario's existing major agricultural policies (with emphasis upon subsidies and other income support programs) upon the environment;
2. Identify the comparative economic impact upon income and production of policies that provide incentives for either misuse or appropriate use of the environment;
3. Recommend how existing policies could be modified or new programs introduced to make them more consistent with imperatives for sustainable development without diminishing the market orientation of the farm sector.

The study was focussed on the farm sector, and on the immediate impact of public policies on the farmer. It neither considers the important role that research plays in developing new alternative methods of farming, nor the public supported activities off the farm that assist farmers to market and gain a good price for their output (such as inspection and grading services). Its main focus being on farm incomes and how they are directly influenced by policies having a positive and negative impact on the environment.

This chapter provides a brief review of the environmental issues that are associated with farming in Ontario. It also contains a review of the provision and financial significance of public support to the farm sector in Ontario. Chapter two provides a conceptual review of how the issues and the public support policies may be related. Chapter three outlines a set of environmental objectives which if incorporated into farm policies could address the issues outlined in the first chapter. It also describes how current trends in the sector are generally inconsistent with the environmental objectives. Chapter four examines how individual types of policies contribute to this problem, and how they could be modified or addressed. Chapter five continues this discussion, developing a strategy for a set of policies in order to define policies for the sustainable development of the sector. Chapter six consolidates in one place the major findings and recommendations of the study.

The study is intended to reflect the current state of knowledge about the environmental issues associated with farming in Ontario. Time, resources, and the mandate provided for the study

did not permit any collection of original data. Some original analyzes of existing information were undertaken, but the emphasis of the study was to synthesize and reinterpret the existing knowledge base.

The shortcomings of the study arise from the inadequacies of the information base. This should not be read as yet another plea for more information – the truth is that in this area governments still lack the information they feel is necessary to justify changes in policy. At the same time, the lack of policy interest in this area justifies a minimal commitment to improving information. This report provides enough justification for governments to take strong action on policy reform. This by itself will then create the market for better information.

The environmental problems of farming in Ontario

The Province's agricultural sector is the largest, most geographically extensive, primarily domestic oriented agricultural sector in the country. Its farms, compared to the Prairies, are smaller but still quite large, and produce a wider range of food products, both as a sector as a whole and on an individual farm basis. This is partly because of its domestic market focus, and partly because of its soil resources. Its soils and climate offer no serious constraints to the Province producing temperate, annual crops as well as a diverse range of fruits, the major exclusions being frost sensitive species, such as citrus fruits.

Environmentally, Ontario's problems are not much different from the states immediately to its south, but somewhat different from those of the Prairies. Its soils tend to be moist, and farmers in the region have not had to adopt the extensive, moisture conserving and low moisture consuming production practices of the Prairies. Its large local markets have led to the growth of a diversified sector. It provides not only vegetables and fruits, but grains as well, both for direct human consumption, and for use along with forages as feed for a large population of dairy and beef cattle, hogs and poultry. The wider distribution of perennial forages and fall sown grains, combined with moist soils and longer growing seasons has meant that, compared to the Prairies, soil erosion is not so obvious. However, there is no doubt that its effects are more widespread than visual signs in fields would suggest to the layperson. There is evidence of considerable amounts of runoff of agricultural soils into surface waters, creating problems of sedimentation, and of pollution of waters by animal wastes, plant residues, and chemicals (fertilizers, herbicides and pesticides).

The development of technologies based upon chemical herbicides has made it easier to gain considerable economies of specialization from the almost continuous row cropping of corn and other annuals without forages. Corn and some of the other crops are sown in distinct and quite

widely separated rows. Thus the area of the Province exposed to water erosion particularly during storms and during snow melt have considerably increased as the area in spring-sown, rowing cropping has increased.

Residues from pesticides, fertilizers, plants and animal wastes inevitably end up in surface and ground waters. The relatively heavy reliance of Ontario's farmers on pesticides is not well appreciated. In 1989 an average of 1 kilograms of pesticides were applied to every hectare of farmland in crops or in fallow. This does not compare particularly well with some European countries that have started activities to limit their use. For example, Sweden has brought its use down from about 0.7 kilograms per hectare per year of all forms of farm land to 0.36 in 1989. The equivalent figure for Ontario in 1989 was 0.6. However, Ontario compares well with the worst cases. For example, the Netherlands has a plan to bring its consumption down from 5 kilograms per hectare per year to 2.5 by the year 2000 (Weinberg, 1990, quoted in Anderson et al, 1991). Significant traces of atrazine, nitrogen and phosphorus from agricultural sources are appearing in water in Ontario, giving rise to concerns ranging from the potential effects on human health to the eutrophication of water systems, including the Great Lakes (Ball Coelho et al, no date; Environment Canada et al, 1991; Miller, 1990; Miller et al, 1989).

Agricultural activities are very considerable human-made intrusions into natural systems. Although many of the resulting environmental problems have been occurring since the sector began to cut down trees for farming some 150 or more years ago, the current level of concern about farming's environmental impact is greater than it has ever been for a number of reasons:

- greater awareness of the problem, and an increasing well informed and demanding public with respect to the supply of good quality water, quality foods with minimal chemical contamination, habitat for wildlife and flora, and the preservation of somewhat intangible aesthetic characteristics for quality of life and recreation.
- adoption of crop production techniques that result in greater runoff of contaminants into water systems than was previously the case,
- the numbers and geographic concentrations of livestock with the concomitant waste handling challenge to avoid pollution,
- negatively synergistic effects of declines in the quantity and quality of habitat for wildlife and flora,
- bioconcentration of pollutants in the food chain,
- rising concentration of contaminants in major rivers and, particularly, the Great Lakes,
- increasing focus within farms on using land for annual crops and the decreasing importance of perennial forages,

- emerging concerns over policy inconsistencies - agricultural policies are not well understood and subject to little critical review by the general population. On the other hand, wildlife and other ecologically oriented groups have for a number of years voiced concerns over the ease and extent that wetlands and other natural areas have been converted into farm land with the support of subsidies.

The Province's large urban and rural but urban employed population has brought about some additional environmental concerns in the countryside. The speculative land market created by the increasing urban and non-farm rural residential population has led to concerns about the continuing sufficiency of supply of agricultural land. They are also concerns about the quality of husbandry that is practiced on land still in farming but owned by non-farming interests. If present trends continue much of Ontario's farmland will not be owned by the farmer but rented. There is some evidence that land which is rented is not farmed so as to conserve its soils to the same extent as owner cultivated lands (Duff et al, 1991).

Conflicts also have arisen in many places between farmers and rural non-farm residents. They involve those moving into areas to enjoy the aesthetics of the countryside, and the other side of the same coin, from the farmers' point of view, the noise and smell of animal-based operations, and their desire to make their operations more efficient by the removal of hedgerows and other field boundaries.

The effects of these issues on farm incomes has been insidious and not always negative. Farmers' equities have been improved not only by land speculation and government income support programs, but also by the growth of a considerable market for rural residential estates which have frequently replaced uneconomic and abandoned farms. Some of these new residents have also adopted farming on their property creating a new type of farmer, who have not yet had any substantial impact on policies, but they undoubtedly will.

Farmers' activities are degrading their soil and water base, but it must be borne in mind that even though the potential crop yield losses this creates has been estimated at over \$0.5 billion annually (Ontario Ministry of Agriculture and Food, 1990), this estimate does not incorporate the costs of corrective actions. In addition, many farmers will have experienced off setting increases in productivity even though soil degradation was occurring.

The environmental impacts of degradation felt off the farm never have been internalized into the farming business in a satisfactory manner. There is evidence that they are of a greater magnitude than the on-farm costs, and may provide a more satisfactory base from which to

justify policies to reduce farming's environmental impact than the on-farm costs. The reasons for this relate to their greater value compared to on-farm costs of erosion, the unknown ecological and health risks of continuing, widespread, low level pollution of soils and water, and the uncertainty and priorities for action these risks create in the public's minds. At present statistics on the off farm impacts are quite limited. There is only one comprehensive survey (DCH et al, 1985) and it does not include more recent concerns relating to impacts on the health of humans and wildlife. Currently a study is underway through the existing Canada-Ontario Soil and Water Environmental Enhancement Program which may improve this situation.

Farm policies in Ontario

Until recently, environmental policies for agriculture in Ontario were almost non-existent. Increasing concerns over the impact of agricultural drains on the supply of wetlands became an important issue in the late 1970's. Pesticide regulations were strengthened after the experience with DDT. A number of events have now begun to change this situation:

1. Both senior levels of government have begun to offer financial incentives to control soil degradation and to improve the management of animal wastes. In Ontario pressures for these innovations have come more from non-farm than farm sources. Contamination of ground and surface waters is a general and growing problem, which is exacerbated by the channelling of streams into the Great Lakes, which act as a reservoir for the water borne pollutants of their basins. Both Canada and the United States, following pressure from the International Joint Commission, have initiated projects designed to reduce the level of contamination in the Great Lakes from agricultural sources. Contamination of ground and surface waters used for recreation and water supplies by farm chemicals and animal wastes have become a frequent concern around the Province. Urban populations have been forced to broaden their interests in farming to include the question of pollution as well as food supply, though, compared with secondary industry, the situation has not yet deteriorated to a state of hostility and distrust.
2. Conservation crop farming techniques are now financially more attractive compared with traditional approaches based upon the mold board plough. Recently a number of commodity prices been declining, and there has been a substantial convergence with real input costs. The latter have been increasing because of changes in the prices and levels of consumption of energy-based products and credit. The net result has been to make production systems which use less of these inputs, largely through having smaller inputs of machinery and purchased chemicals, financially more attractive than previously. This issue will be discussed in more detail later in the report.

Leverage of government programs in Ontario: part one

There are a range of programs provided by the Ontario and Federal Governments in support of agriculture, and most ultimately have a significant impact on farm incomes and farm production practices. These range from:

- research, and product inspection and grading services which have been shown to have a substantive effect on farm incomes;
- supply management programs which have allowed the farmer not only to avoid oversupplying markets for certain commodities and have provided more secure financial returns than would occur in a less organized market. They also have provided additional revenues to farmers by protecting them from competing products from other provinces and other countries;
- other border protection policies of various kinds which give local production a price advantage in Canadian markets over competing, non-Canadian products;
- various income protection programs designed to provide farmers with income transfers for reduced revenues caused by unexpected declines in commodity prices, and for declines in yields caused by natural events;
- programs to support capital investments ranging from incentive programs to encourage farmers to make investments in the public interest, for example, in manure handling facilities, to ones designed to relieve some of the pressures arising from the combination of high interest rates, high prices for land and other capital investments relative to commodity prices;
- programs to help maintain competitiveness through reductions in operating costs, such as rebates and tax concessions on farm chemicals and fuels.

The exact contribution all these programs make to farm incomes is not known with any certainty. Various attempts have been made at the national level, at the instigation of the OECD, to bring all the various economic effects to a common base – the so-called producer subsidy equivalent; some of this information for Canada as a whole is included in this report.

The major forms of support are:

- direct income support programs, operating through a combination of ad hoc programs and publicly subsidized revenue insurance schemes to compensate for temporary declines in market prices and yields; and
- supply management policies and programs for milk, eggs and poultry products;
- Western Grain Transportation payments (for the Prairies).

The key point about such programs is that they all have been designed to be resource neutral. In other words, all units of output are treated the same. The rationale being that government programs should not determine who produces what, the market place should do this. Although this concept has been criticized on the grounds of income equity, it has not been subjected to a critical review from an environmental perspective. When this is done, as this report will show, just as resource neutrality provides transfers of public funds to farmers irrespective of their need, it is equally insensitive to environmental impacts. In the case of the equity of income transfers it can be argued that at least some of the more generous transfers are collected back through income taxes. There are at present no equivalent checks and balances for the environment.

Some idea of the size of benefits to farmers from agricultural policies is provided by OECD-led calculations of the proportion of net farm returns from specific commodities accounted for by policies. For Canada as a whole the following levels of support were provided in 1990 (Agriculture Canada, 1991):

Dairy – 79 percent value of production

Beef and veal – 36 percent of value of production

Wheat – 43 percent of value of production
(note this reflects policies for the Prairies rather than for Ontario)

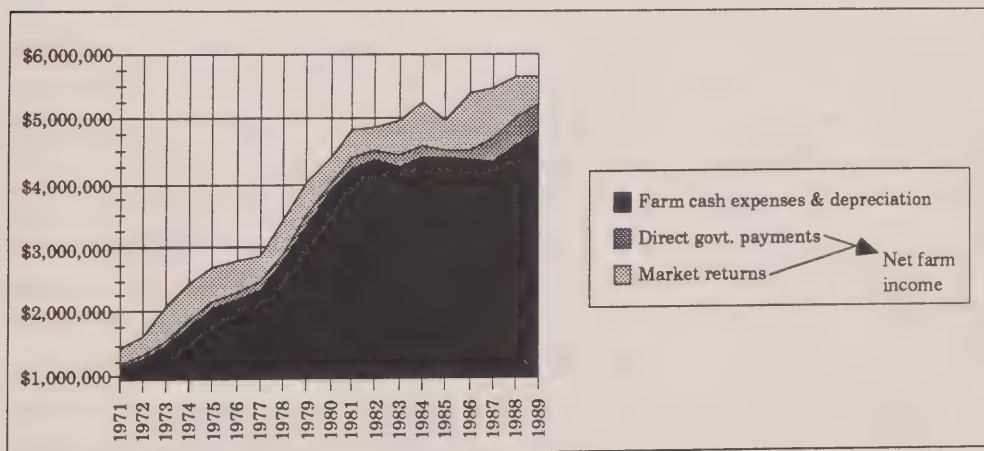
Hogs – 16 percent of value of production

Soybeans – 14 percent of value of production

Corn – 16 percent of value of production

The equivalent percentages for net returns would be much higher.

At the same time, two other significant and related events have occurred. Agricultural policies were broadened and strengthened in Canada during the 1960's and the 1970's in order to promote a fair return for farmers and to provide them with a measure of income security against short term variations in yields, caused by natural factors, such as droughts, frosts and excessive rains, and in market prices. The subsequent and unexpectedly large declines in commodity prices, rapid convergence of commodity and input prices, and increases in real interest rates have resulted not only in financial stress for farmers but also in an unexpectedly high level of public expenditures directly supporting farm incomes. The result has been that transfer payments, and payments from publicly-subsidized yield and price insurance schemes now account for almost 50 percent of net farm cash incomes in Ontario (a lower proportion than on the Prairies). The situation is shown in Graph one. Most of any recent increase in net farm income has come from increases in direct government payments. In addition, and not shown on the graph, there has been the income enhancing effect of input subsidies realized through tax concessions and marketing arrangements (supply management), which have a similar income effect as the direct government payments of recent years. These are approximately as important as direct government payments. In other words, in Graph one approximately one half of the so-called market returns of recent years are in fact misnamed as they are a direct result of government policies. Previously, when commodity prices were better, the impact would have been proportionately smaller.



Graph one: Ontario farm cash receipts and expenditures 1971 to 1989

This support is provided to farmers in such a way that they are rewarded financially for some

of the very practices that are causing or exacerbating the sector's environmental problems rather than assisting to address them by favouring better alternatives. This issue is the subject of this study, which describes some of these effects and brings forward suggestions on how public support can be provided in a more consistent and positive manner.

The contradictory trends that have just been described should be noted. Prices may be encouraging farmers to reduce the negative aspects of their operations on the environment. At the same time, governments are intervening to promote moves in the same direction, yet most of their efforts and expenditures are directed towards policies working in at best an uncoordinated and at worst a contradictory direction.

Chapter two

Agricultural policies and the environment - conceptual

The Federal and Ontario Governments in practice continue to ignore the trade offs and opportunities between policies for the economic development of the sector and those intended to mitigate agriculture's environmental impacts. Yet the two sets of policies or policy needs are not independent. For example, subsidies for stabilizing the economic returns from specific commodities will not only be capitalized into land values but will also reduce the income risk to the farmer of producing that commodity. This in turn may favour the increase in area of land used to produce the commodity, perhaps into marginal areas which are more prone to soil erosion, or which otherwise would continue to provide habitat for some critical species of wildlife. Reduced income risks may also encourage a greater intensity of inputs in the production of the commodity, which in turn may lead to more runoff of agriculturally sourced pollutants. On the other hand, pesticide regulations may change farm production costs, and hence the potential for sectoral development by either limiting the availability of pest control technologies, or by increasing the prices of products as a consequence of the costs of registration. Policies can then affect the relative prices of inputs and the relative returns from food products. These in turn can have considerable impacts on the structure of agriculture and its impact on the environment, both now and in the longer term.

The structure of policies will determine how easy it would be to coordinate agricultural and environmental policies so that the combined set of policy objectives are met. Generally, environmental policies have tended to be based on the application of regulations, investment subsidies and the provision of information. Agricultural production policies have tended to rely on investment incentives and income subsidies, or on the creation of new institutional arrangements for marketing (supply management). Even where there is reliable information of contradictory cross-policy effects, it is not likely that the coordination required between the policies could be achieved with the set of instruments now being used. In particular, there is a need to provide incentives for good environmental management practices through agricultural production policies if unnecessary program conflicts and inefficiencies are to be avoided. It appears that the coordination of production and environmental investment subsidies may be relatively straightforward. However, the same cannot be claimed for direct cash income support policies.

The institutional arrangements supporting agriculture are also very important. The term covers

a broad range of issues, including policies towards sensitizing the farmer's private market place to a greater breadth of environmental effects of actions on the farm, to the environmental implications of policies to reduce public expenditures and to increase the self-reliance of the private sector. What are the implications of shifting responsibility for much research, delivery of programs and information dissemination to the private from the public sector? Are there inconsistencies between the Province's continued recognition of a farmer's private property rights with the Province's objectives for environmental management?

Supply management is an institutional arrangement designed to promote a more equitable sharing of returns from the production and sale of specified farm products than would otherwise be the case. Is it structured in such a way as to promote its managers also accepting responsibilities for addressing the environmental impacts of the management system and the production it serves? Supply management also incorporates some powerful policies, particularly for dairy and egg products, that result in consumers paying subsidies to producers in the market place compared to a situation where costs of production formulas did not determine prices. Are these subsidies provided in a way that is consistent with reducing the risk of environmental problems occurring on the farms involved?

Finally, the commodity based institutional arrangements which dominate the farm sector in Ontario create a market for particular types of information systems and bureaucratic structures in both the public and private sectors. These in turn affect the way in which policy issues are identified and addressed. They may not be organized in the most effective way to achieve the coordination of agricultural and environmental policies. Agricultural policies tend to be organized around markets for commodities and to a lesser extent for inputs. Generally, there are few markets which have to be involved, thus making a commodity, province-wide or greater geographic scale orientation practical. Environmental issues, on the other hand, tend to be more geographically specific or localized and related to farm as opposed to commodity based ecosystems (of course, the latter can only exist where monoculture is practiced). They require a more decentralized approach to priority setting and program delivery.

The performance of the sector developmentally and environmentally is difficult to measure, thus exacerbating the difficulties. The performance of markets is generally measured by the efficiency with which resources are allocated, and by the equity of the distribution of benefits and costs between their participants. The same approach, to a point, can be used to address environmental concerns. The definition of markets and resources can be broadened to incorporate natural resources, and the effects of and distribution of economic and population effects in ecosystems as well as markets. Not only is such an approach complex, but it may be an

unsatisfactory representation of our true interests. The two economic performance objectives of efficiency in the use of resources, and a just distribution of the benefits and costs do not incorporate consideration of the proper scale of impact from a biospheric as opposed to human-spheric point of view. Natural cycles, such as the hydrological and carbon cycles cannot be manipulated to increase their output of desirables as easily as agricultural systems. Economic systems have a built in tendency to grow disproportionately with respect to the ability of natural systems to respond. This is the basis of recently re-expressed concerns about carrying capacities, elegantly captured by Daly (1991)

The major task of environmental macroeconomics is to design an economic institution analogous to the plimsol mark - to keep the weight, the absolute scale, of the economy from sinking our biospheric ark.

There is no reliable monitoring system in place to provide this type of information for Ontario,. This needs to be addressed as a priority by the Government. Some of the factors that should be included to monitor the situation in agriculture are discussed in the next chapter.

Chapter three

Environmental goals for farm production

The Federal and Ontario Governments, as members of a recent task force on environmental sustainability in agriculture (Agriculture Canada, 1990a), identified eight issues or areas where the sector's performance across Canada should be improved. They were:

1. Soil degradation and urban encroachment,
2. Surface and groundwater quality,
3. Water quantity,
4. Wildlife habitat,
5. Air and climate, including ozone depletion, climate warming and air quality,
6. Energy inefficiency and the lack of alternative sources of energy,
7. Pollution and waste management,
8. Genetic resources, which included both concerns over the narrowing of the genetic base for farm production, and loss of genetic diversity which could limit the range and supply of genetic material for application in the sector.

It is understood that in Ontario's case both senior levels of government are now in the final stages of concluding an accord recognizing all but concerns #3, 5, 6 and 8 as areas for joint action. Concern #3 is not considered a sufficiently important issue in Ontario to warrant action at this time. The other three excluded concerns will be addressed nationally by the Federal Government. This study follows this same selection of issues. The remaining four issues are used with the following modifications or clarifications:

1. The issue of the declining genetic diversity of natural vegetation and of wildlife populations will be considered as part of the concern over wildlife habitat.
2. The issue of the efficiency of the use of sources of energy on farms will be considered since the use of non-renewable energy-based inputs is a major factor in soil and water degradation. The production of bio-energy as a farm product, for example, the potential use of corn in ethanol production, will not be considered. However, it should be understood that the desirability of producing corn for this use should be determined in a way consistent with the generally accepted principles for sustainable development.

Soil erosion

Reducing soil erosion not only would help to maintain soil fertility, but:

- reduce pollution of surface waters from agricultural chemicals and field-spread manure,
- preserve or improve soil fertility,
- reduce siltation of waterways, wetlands, drainage systems and culverts,
- improve water and habitat quality as a result of above.

Soil deterioration has been a chronic problem in Ontario since farming began (Wilson, 1989). The current heavy dependency on corn and other row crops rather than small grains and forages has led to increased rates of degradation (Anderson et al, 1991). Not only have these production practices increased rates of soil erosion but lowered organic content of soils and led to soil compaction. These combined effects have increased the rate of water runoff, thus leading to more water pollution than soil erosion by itself would have produced.

Water pollution can also be exacerbated by the use of chemicals in no tillage and reduced tillage systems. These systems may reduce soil erosion, but they do not necessarily result in less water pollution as the density of chemicals per unit of runoff can be increased. A possible control for this would be to increase crop rotations and diversification so that on average less chemicals would be applied in any year to any field.

In Southern Ontario in 1986 only 1 percent of a sample of farms were found not to be practicing crop rotations, 10 percent rotated row crops and 32 percent row crops and cereals. Reduced tillage was only practiced on 26 percent of the farms, the remaining 74 percent depending on the mouldboard plough (Coleman and Roberts, 1987). A later study in Perth and Oxford Counties showed somewhat similar results. This same study found that 86 percent of the sample of farmers had recognized soil erosion as a serious problem, though not necessarily on their farm. Some 59 percent confirmed that sheet erosion was present on their farms, and 74 percent confirmed rill erosion. However, no clear evidence of many farmers adopting soil erosion control practices because of the observation of soil erosion was found. Most of the practices that had conservation benefits were selected as components of the mixed farming system, and their environmental contribution was coincidental (Duff et al, 1991). The study did not evaluate how successful the practices were at controlling erosion.

The realistic costs of soil erosion in Ontario are

not known. Various sources have calculated the economic value of production capability lost to soil erosion, but they all have ignored not only the costs of ameliorative measures but whether any economically feasible controls exist at all (see van Kooten et al, 1989). From a public's point of view, it is probably safe to conclude that, as Crosson did for the United States (Crosson and Rosenberg, 1989), that the on-farm costs of soil degradation are not significant compared with the inefficiencies of farmers not utilizing all technological opportunities. Nor would soil degradation have any significant impact on the ability of the farm sector to meet future production requirements. However, soil degradation leads to pollution of surface waters, and it is this more than anything else that makes it significant. In other words, its impacts off the farm are much more significant.

This leads to a serious equity question related to who should pay for and who should benefit from the prevention of soil degradation. The off-farm impacts are predominantly the result of the accumulated impacts of the long run effects of individually insignificant decisions by many farmers. This implies that legal enforcement of pollution contraventions would be not only expensive but difficult to prove. The high financial leverage of existing agricultural programs provide an opportunity for the use of incentives rather than penalties to achieve the desired result. In addition, the Federal and Provincial Governments have to accept responsibility for at least some of the pollution that has and is occurring. Their programs have encouraged farmers to adopt practices which have fostered increased rates of degradation, and have made the adoption of mitigating practices more financially difficult for farmers than they would otherwise have been (see later in this report).

The Federal-Provincial Agriculture Committee on Environmental Sustainability concluded that a number of criteria should be used in the design, delivery and evaluation of policies and programs (Agriculture Canada, 1990a, page 40). The following list of performance considerations, which will be used throughout this report, is based directly on their criteria applied to the activities of farmers:

1. Maintenance and/or improvement in the capacity of farmers to meet present and future food and fibre needs,
2. Optimal efficiency and effectiveness of programs' impacts on farming – based upon assessments that include both the on-farm and off-farm environmental benefits and costs. These benefits and costs relate to such factors as:
 - a. The quality of soils – thus including consideration of such costs as soil erosion, and such benefits as increasing the organic content of soils. The latter would lead, amongst other things, to reduced levels of atmospheric carbon dioxide as well as more inherently fertile and water retaining soils for current and future farm production,
 - b. The quality of surface and ground waters – thus including such costs as the contamination by eroded soil, pesticides, plant and fertilizer residues, livestock manure, milk-house wastes, etc. These costs are borne by any number of sectors including farming itself (contamination of human and livestock's drinking water), recreation, wildlife (for example, nutrient enrichment of wetlands and the Great Lakes), human health (unknown risks of long term exposure to low levels of pesticide-sourced and fertilizer-sourced contaminants in water supplies),
 - c. The consumption and supply of non-renewable natural resources as farm inputs, thus including not only the consumption of petrochemical products, but:
 - the production and use of naturally occurring substitutes for petrochemical products used in the production of food, including green manures, nitrogen fixation, integrated pest management,
 - the clearance of woodlands, the draining of wetlands, etc. for agricultural production, and the planting of shelter belts, retention and replacement of wetlands within farm properties.

Water pollution

Water pollution from farming can come from manure and wastes from the on-farm handling of milk. Manure can run straight from storage areas next to barns, from cows grazing near and in water courses, and from run-off from fields where manure has been spread. Agricultural chemicals and plant residues in fields growing crops can also pollute ground and surface water systems. Apart from the slope of fields, other factors influencing the rate of run-off of pollutants from crops are:

- rate of application - there is evidence that in the U.S. many farmers tend to have over optimistic expectations of yields and used recommended applications beyond the uptake capacity of their crops (Kelling, 1990). This was particularly true of farmers who had diversified and not taken the risk of specializing in one or two crops (Legg et al, 1990). This implies that many farmers are not being given the correct information or are not using it properly. Improved standards for farm planning, perhaps the requirement of conservation plans and for the greater use of soil testing and other diagnostic services may be required to retain eligibility for farm programs.
- Type of crop - more water runs off row crops, more runs off annual than permanent crops. Shifts towards specialized, cash crop farming, and particularly the greater use of row crops, such as corn and soybeans, has led to increased water pollution from soil sediments, fertilizers, spread manure and pesticides. The impact on hydrological systems can be reduced by encouraging greater diversity of crops within an area.
- Timing - Ontario's farmers have quite short windows in spring to complete seeding, and most artificial fertilizers are spread then. Unfortunately, soils also tend to be wet at the same time so that heavy rains can cause considerable runoff of fertilizers and other chemicals. This can be minimized by good timing in relation to weather events, accurate placement of chemicals, incorporation of fertilizers into the soil as part of the planting operation, etc.

The spreading of manure on fields in winter before spring thaw is still popular. Like other forms of fertilizer it needs to be quickly incorporated into soils after spreading - in 1986 only 14 percent of a sample of farmers in Southern Ontario indicated they did this within 24 hours of spreading, as recommended in Ontario's Agricultural Code of Practice. Some 32 percent tended to wait

more than three days (Coleman and Roberts, 1987). It is difficult to understand why such a practice has not been banned completely.

- Soil type - sandy soils will have higher rates of water percolation, consequently there is greater risk of ground water pollution on sandy soils. At the opposite end, soils with a high clay content will have higher rates of surface runoff. Rates of percolation can be controlled by timing and the types of crops grown.

None of these considerations are reflected in the eligibility requirements of programs, except those for conservation farming (accounting for less than two percent of public expenditures on farming in Ontario). Thus the current high leverage of programs on farmers is not at all directed towards supporting any of these practices. In fact, as this report will show, the opposite is sometimes the case.

The impact of water pollution from farming is widespread. It ranges from the loss of fish species to the growth of algae in Lakes including the Great Lakes. Traces of pesticides are appearing in ground water (Beck and Scafe, 1989) - these are not considered to present a health risk but it must be borne in mind that:

- the effects of chronic exposures to low levels of these new chemicals is not known with certainty,
- the build up may be an indicator of higher levels that will accumulate in the future,
- eradication if necessary from ground waters may be a protracted process.

Note that control of water pollution requires good farm management and an approach towards the selection of production technologies akin to that necessary to control soil erosion. The key is diversity of production, avoidance of relying on a few crops, careful timing of applications of chemicals, manures and composts to fields, and the careful management of plant and animal wastes. Furthermore, it must be noted that avoiding the use of chemicals will probably not avoid pollution problems. Manures, which are potential sources of pollution, may be substituted and can be just as badly mismanaged.

d. The maintenance and/or increase in the genetic resources of farming as well as in the wildlife and flora on and surrounding farms. For example, this could be achieved through:

- the provision of habitat for wildlife in farm drainage ditches and other water control devices, and in shelter belts around fields,
- the management of grazing and forage harvesting to be compatible with the breeding requirements of wildlife, and
- reductions in the use of pesticides and fertilizers harmful to the viability of non-targeted invertebrate as well as fish, bird and mammal populations.

Applying these considerations would imply that a more sustainable pattern of agricultural production would exist when:

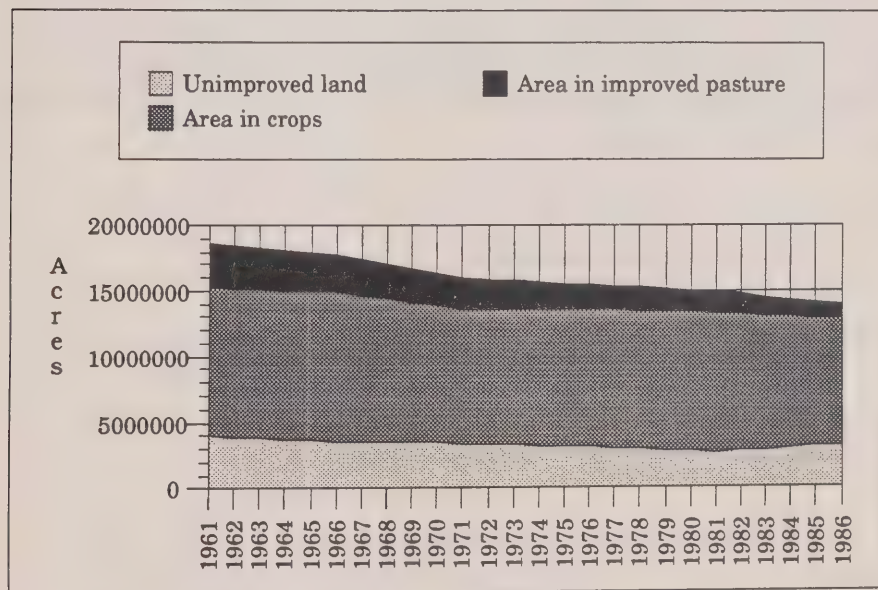
1. Farmers' concerns regarding markets, capital investment and debt are addressed by providing reasonable returns to their labour and investment:
2. At the same time, environmental objectives would be met through:
 - the use of rotations, cover crops, companion plantings and cover crops on lands of sufficient soil quality and low susceptibility to erosion to protect soils and water with:
 - the maximum use of nutrient recycling, naturally occurring production of nutrients, energy and systems of pest control,
 - the minimum use of non-renewable energy resources and the minimum production of pollution from plant and animal wastes, and so as to:
 - maximize the compatibility of agriculture with the achievement of objectives for wildlife, natural areas, flora and genetic diversity.

A farming policy that would support these types of changes could not rely predominantly, as present policies largely do, on the maximization of farm incomes and product sales through economies of specialized production of a limited range of commodities. These economies would need to be supplemented with economies of complementary environmental relationships (Harvey, 1990, Girt and Neave, 1991).

It must be pointed out at this stage that farmers have always been dependent on such complementary economies. They are not so much in need of a paradigm shift themselves as a

paradigm shift in the practice as opposed to rhetoric of government and the discussion of the management priorities of the sector as a whole. The issue is one of creating an economic framework for farming which reflects the complementary relationships more directly and completely.

Recent technologies, as well as economic trends and the policies and programs of both senior levels of government have all worked together to set Ontario's farm sector off on a path of change quite different from that recommended above. In recent decades the land base remaining in farming has become smaller, but the area intensively used has not declined as much. At the same time, the use of chemicals and the amount of food produced have been increasing. More is being gained from less natural resources, but not without considerable risk of over stressing the environment.



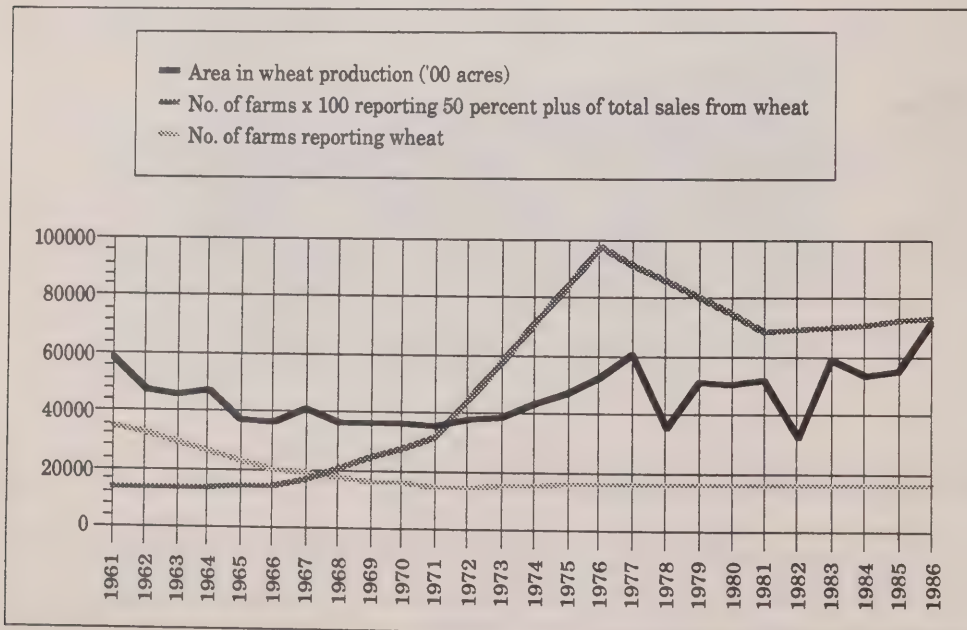
Graph two: Ontario land use on census farms 1961 to 1986

The area in farms devoted to crops now accounts for an increased share of improved land (land that has been subject to some sort of cultivation practice over the past five years) (see Graph two). The farms themselves have become fewer in number, and those remaining are much less diversified. For example, the number of farms growing wheat has declined (Graph three), but the proportion of these farms obtaining half or more of their annual gross sales from this crop

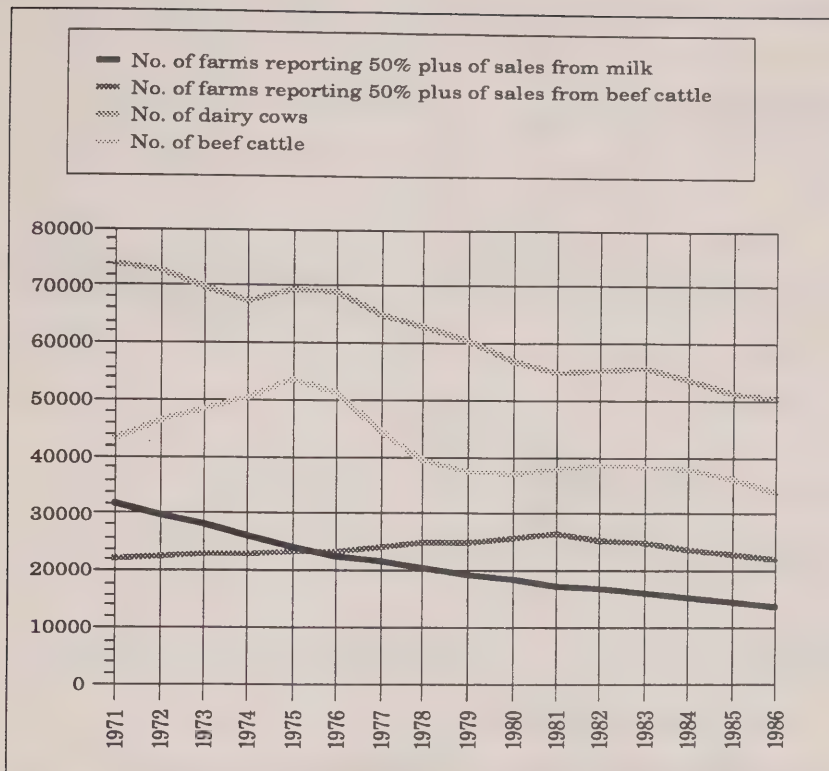
alone has increased dramatically. In livestock production, there is a less pronounced trend towards fewer and more specialized farms (Graph four). This is probably a result of the innately diversified production base of dairy operations, the cap on sizes imposed by dairy quota regulations, and economic difficulties of Ontario's beef producers in the North American market, which has become increasingly dominated by western producers and meat processors.

These trends in crop productivity need to be related to the trends in the consumption of fertilizers and pesticides (Graph five). The consumption of these inputs has approximately doubled since the late 1970's, yet there is no evidence that this has resulted in an equivalent increase in crop production.

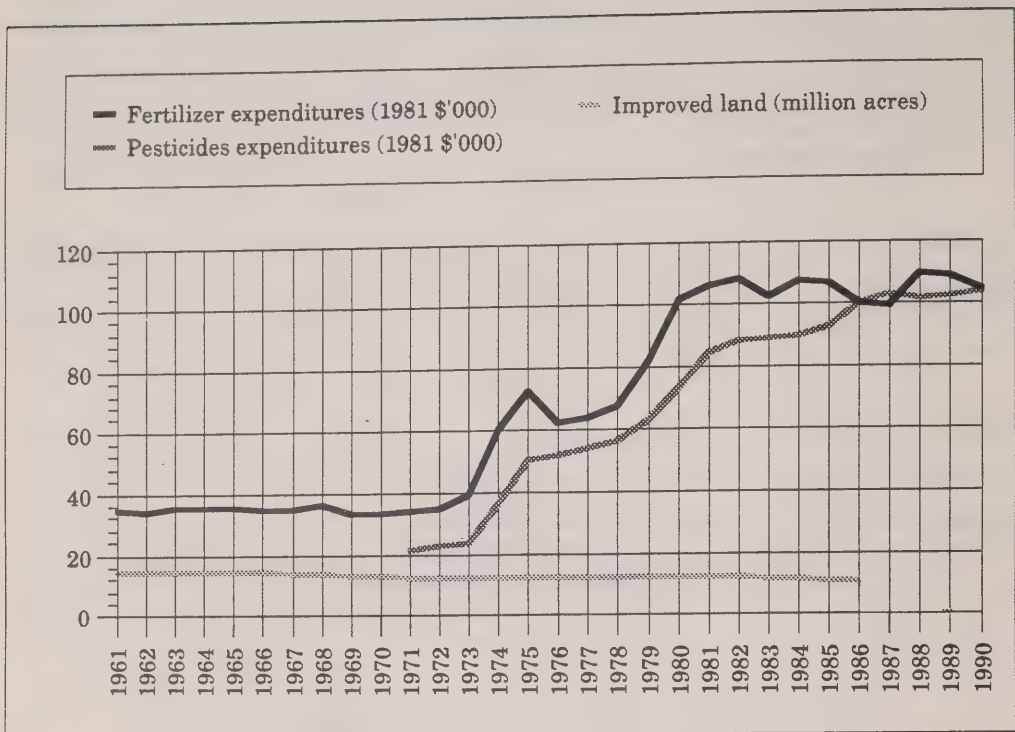
The increasing specialization of farm production, diminishing returns from the consumption of fertilizers and pesticides, and the use of a greater proportion of farm land for annual crop production all indicate that Ontario's farming sector as a whole is not moving in the directions defined on page 14 as necessary for increased sustainability. Recent increases in physical crop productivity – interpreted here as the production per sown area – have not been impressive. This is illustrated in the graphs that follow.



Graph three: Ontario trends in types of farm reporting production of wheat 1961 to 1986



Graph four: Ontario: Numbers of beef and dairy cattle and number of farms specializing in dairy and beef production 1971 to 1986

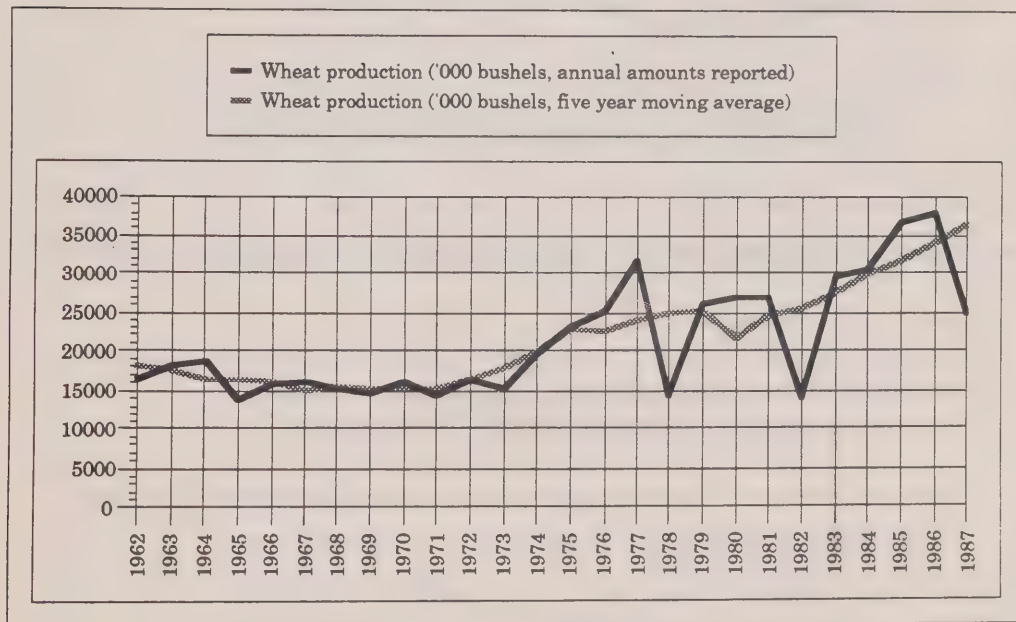


Graph five: Ontario farm expenditures on fertilizers and pesticides (in constant dollars)

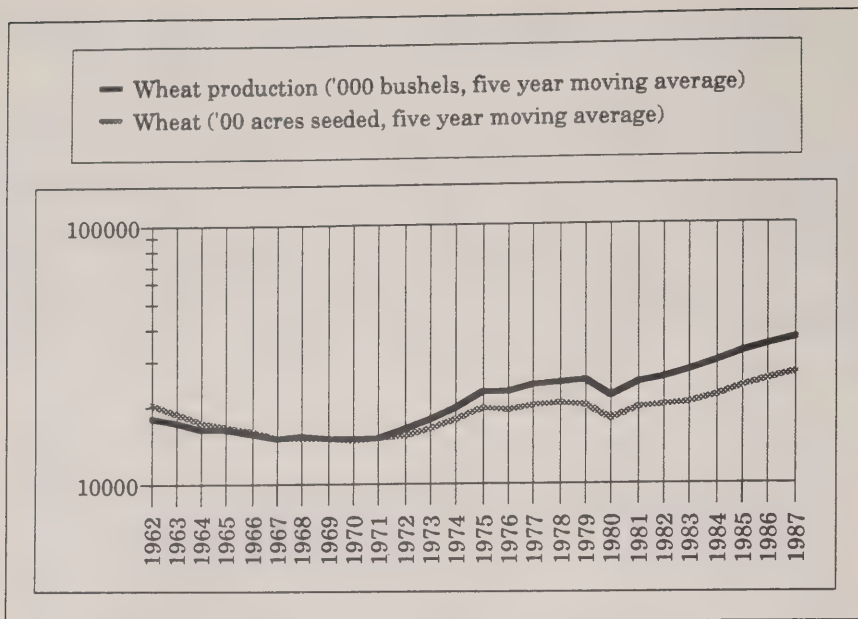
The use of chemical inputs on a declining land base has been growing (see Graph five), but there has been only a small increase in yield for some of the major field crops (Graphs six to ten). In the latter graphs, in order to remove year to year fluctuations caused by short run changes in climate and market conditions, a five year moving average is used to describe longer run trends shown in annual data (Graph six demonstrates the 'smoothing' effect of calculating trends based on a five year moving average). For yield gains to be made over time, the curve for total production of wheat (Graph seven) should tend to have a steeper slope than the curve for the area seeded. (Note that the vertical axis in Graphs seven to ten are on a logarithmic scale.) This did occur. It also occurred for grain corn (Graph eight) and for soybeans (Graph ten), but not for fodder corn (Graph nine). The case of fodder corn is quite worrying in the sense that productivity gains have not occurred recently in spite of a reduction in the sown area. In all cases, the trends in productivity must be viewed in the light of a large increase in the application of chemicals and the development and use of improved varieties of each crop. It must also be borne in mind that the economic situation has been deteriorating as the costs of inputs has been increasing and commodity prices declining. The recent declines in farm incomes and

increased income support payments from governments are a demonstration that these increases in productivity have been insufficient to offset the impact of these price changes.

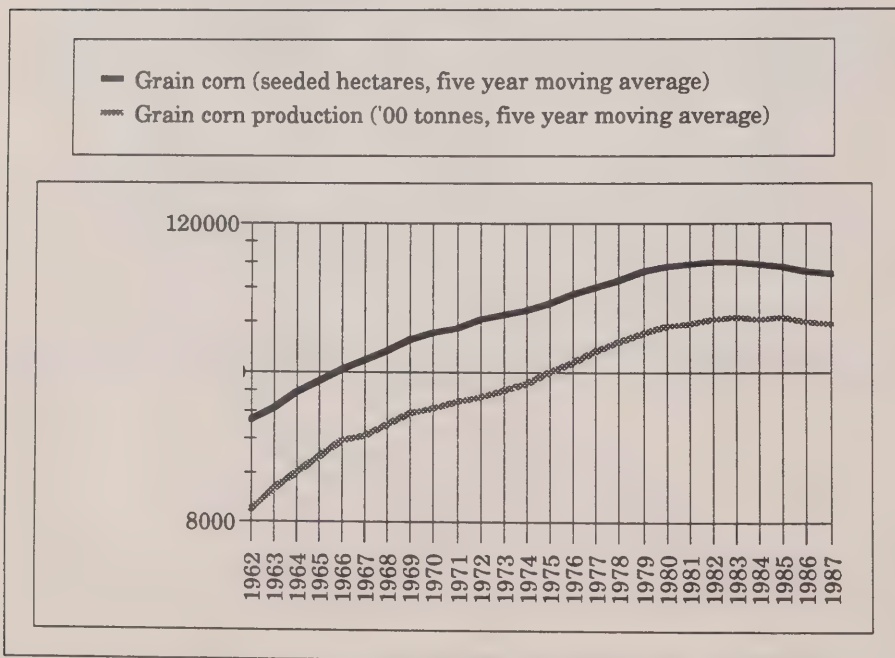
The graphs may reflect a shift towards the use of lower inputs, a rational response to poor economic and productivity conditions. This would, of course, represent a shift towards a more sustainable path of development if accompanied by a diversification of production. At present, there is no empirical evidence of such a change. The adjustment process itself, appears to be retarded by the current policies that exercise a large financial leverage over most farmers. These issues, and the recommended adjustments to policies that are required is discussed in the next chapter.



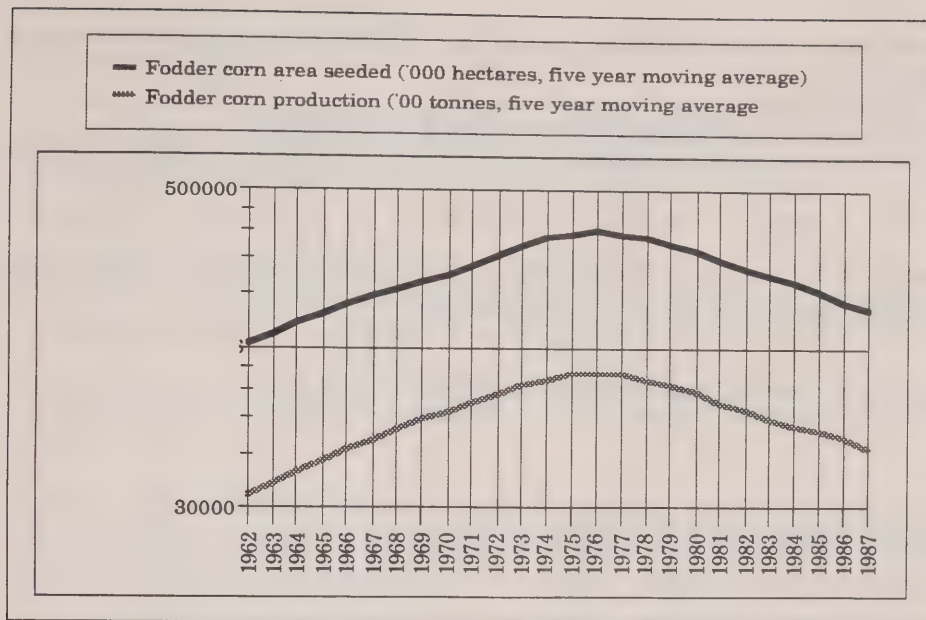
Graph six: Ontario wheat production 1962 to 1987, actual annual amounts and five year moving average



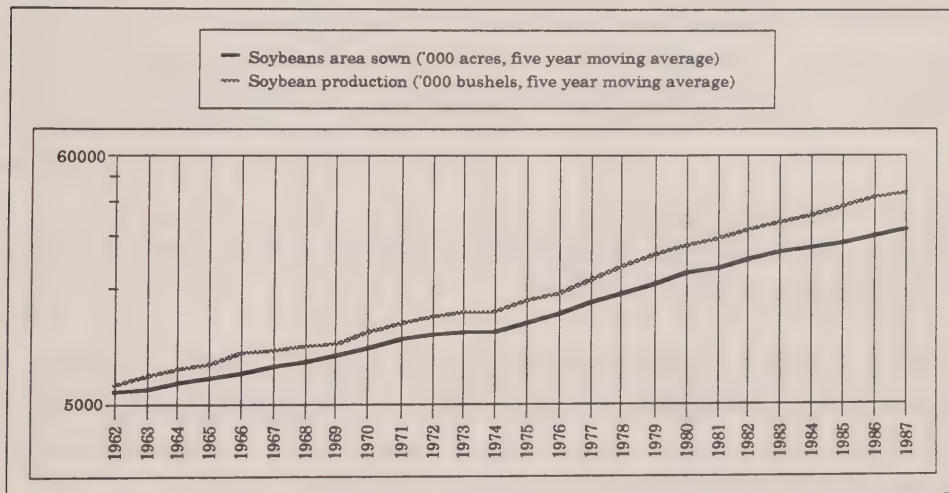
Graph seven: Ontario seeded area and production of wheat 1962 to 1987



Graph eight: Ontario seeded area and production of grain corn 1962 to 1987



Graph nine: Ontario seeded area and production of fodder corn 1962 to 1987



Graph ten: Ontario seeded area and production of soybeans 1962 to 1988

Chapter four

The effects of agricultural policies on the environment

It is exceedingly difficult to isolate the effects of current farm policies from other changes occurring within the agricultural sector. The key points are:

1. That in retrospect many of them have reinforced trends that have not been environmentally desirable.
2. Some have reduced the ability of farmers to respond efficiently to changing market conditions. Market returns were more favourable when most policies were introduced, and they exercised much less leverage than at present. They were designed to provide sufficient protection to facilitate the expansion of the sector without destroying its strong market orientation. Now with unexpectedly large declines in commodity prices, and a faster convergence of revenues and expenditures on inputs, the policies may have become constraints to the sector. Farming may not be adjusting as quickly as it might otherwise do to realize the economic and environmental benefits of new technologies and farm structures better fitted to a mature rather than expanding industry. One that has to operate in rather fixed and increasingly competitive, domestic and international markets (see, for example, Mutch, 1991).
3. The same policies and programs that are environmentally suspect may be inconsistent with trading requirements. Fortunately, solutions may be available consistent with all concerns – see the first two conclusions in this chapter.

A number of conclusions about the effects of existing policies on the achievement of environmental objectives can be made, from which related additional conclusions can be drawn. They are listed below, after which they are discussed in detail one at a time, during which the bases for the conclusions and the implications for future policies will be made apparent.

1. Farmers already in crop insurance and gross revenue stabilization programs will be discouraged from changing from relatively high input and intensive revenue generating production systems to ones relying on lower input and more rotations.

2. It is more desirable to offer farmers income support through programs directly stabilizing incomes than reducing prices of energy-based inputs. It may, also, be advantageous to consider ways of reducing the costs of land relative to commodity prices. The Province and the Federal Government should also revise their strategy towards land improvements on farms so as to prevent a further decline in the supply of important natural areas.
3. The Provincial and Federal Governments should conduct a careful review of supply management systems which incorporates environmental considerations.
4. There is a need to deliver farm programs according to ecological as well as market requirements.
5. For environmental and economic reasons, the Province should encourage the diversification of income sources for farmers.
6. A new set of objectives and a stronger commitment to addressing environmental issues are required to guide the setting of federal and provincial policies and programs for Ontario's farm sector.

Conclusion I

Farmers already in crop insurance and gross revenue stabilization programs will be discouraged from changing from relatively high input and intensive revenue generating production systems to ones relying on lower input and more rotations.

Programs which determine payments to farmers based on yields and outputs for specific commodities, such as the existing income stabilization programs, will encourage farmers to push for high yields, increasing their dependency on artificial inputs. The programs will not necessarily encourage a greater area of production since the net benefits of the programs should be directly reflected in higher land prices. However, farmers may be encourage to use a greater proportion of their existing land base.

Assuming that the labour and capital expenditures required to benefit from increased artificial inputs are not a constraint, such forms of programs will increase the net benefits of growing the crop in question using artificial inputs rather than saving money by not growing the crop, or by growing it on a reduced acreage or with lower inputs. This effect results from expenditures by farmers on fertilizers and pesticides being typically less than 10 percent of production costs.

and far less than the size of the benefits now being received from stabilization payments.

Stabilization programs themselves contain an additional constraint. They tend to provide an additional disincentive to farmers who have intensified their use of inputs to adopt production practices utilizing ones. The resulting loss of income security from such a change in production is likely to offset the savings in input costs.

If farmers were offered income security on a net revenue basis these conclusions would not apply. Under such a scheme farmers would be able to participate in an insurance program that would guarantee a minimum net cash income from farm production based on their historic performance, or on some area average for new entrants. To the farmer, this would mean that a greater share of the risk of making a change in production methods would be borne by the program. Whether this increased burden on the program would eventually enter the producer's contribution to the program would be a policy decision. This should incorporate assessments of the public benefits accruing from each farmer's decision to change methods of production.

The need to increase premiums would also provide a useful indicator to the Government of the level of success of its interventions on the farm sector's environmental performance with respect to input prices, particularly for energy-based inputs, and with respect to the impact of research, technology development, diffusion and adoption. In any event, there are indications – see the information boxes – that the incentives that would have to be provided by governments to offer equivalent levels of income security for conserving as for traditional practices would be less than with the existing forms of commodity specific programs.

A net revenue approach to stabilizing farm incomes would offer a number of environmental as well as economic advantages. A greater use of forages and green manures would be encouraged. Sources of a farmer's revenue could become more diversified and some of the expenditures on fuels and chemical inputs reduced. This diversification of production would have environmental benefits. There is some evidence that crop yields fluctuate less in lower input production systems (Dumanski et al, 1990 for some evidence of this in the case of Manitoba). Consequently, adoption of a net revenue stabilization policy could also reduce annual income instability and, consequently, the costs of stabilization programs, both to governments and farmers themselves. How the total public and private costs of stabilization programs would be affected by a move to a non-commodity basis is beyond the scope of this report. However, it should quickly be investigated using a full cost accounting approach.

The impact of commodity price and yield (crop insurance) stabilization programs: part one

For this analysis the Province will be treated as a giant farm. In 1989 it realized \$5.676 million in crop sales, including stabilization payments, leaving a net cash farm income of \$1.476 million after \$4.2 million of cash expenses were taken into account. Assuming that revenues were exclusively from the sales of commodities and that no payments from stabilization programs were required, what would be the income coverage that could be expected for the 'farm' for the next year, with no changes in acreages planted and yields?

If the stabilization programs together provide a 90 percent coverage, the minimum sales, including stabilization payments, would be \$5.108 million ($\5.676×0.9). If cash expenses remained the same, this would produce a minimum expected net cash income of \$0.908 million ($\$5.108 - \4.200).

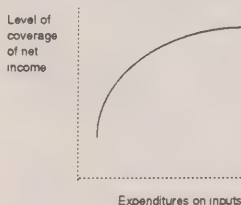
Consider an alternative situation, either the situation before farming expanded production to the state described above, or one where the use of purchased fertilizer, pesticides and farm machinery was reduced by a third and yields were 10 percent lower (perhaps representative of a low input, non-conventional farming system, or a withdrawal of some land from crop production). Compared with the above scenario, the long run annual net farm cash income would be \$0.942 million ($(\$5.676 \times 0.9) - (\$4.200 - 0.67$ of previous costs for farm and chemical inputs - the actual farm expenditures on these items for 1989 in the Province were used)) - 63 percent of the alternative situation. Expected minimum revenues would be \$4.597 million ($\5.108×0.9), resulting in a minimum expected net income of \$0.431 million, only 29 percent of the income received in the first scenario. See the next information box for predictions of what would happen to stabilization support during the first five or so years of such a change in practices.

In other words, the second scenario would provide only 63 percent of the income of the first when market conditions were so favourable that no stabilization payments were triggered, but provide only 29 percent of the income security, not 57 percent (63×0.9) when conditions were unfavourable. Note that conditions would have to be significantly worse than in the first situation for any form of payment to be triggered.

There are many documented examples of farmers who have experienced temporary declines in yields when adopting lower input-based production technologies. There are also cases when this did not occur, but we will retain

a pessimistic outlook for the present. Apart from the need to learn and refine technologies to best suit a farmer's own circumstances, weed populations can change markedly and a few years are required to bring about a changed and generally less numerous weed population. Current income stabilization programs, based on limiting revenue fluctuations caused by short term variabilities in yields and commodity prices, reduce the level of net income stabilization support offered to the farmer during this challenging period.

Now consider the corollary - the second situation is the current one. Increasing the area farmed and increasing inputs, would provide not only more income but an increased level of publicly subsidized net income security. Before the increase, using the same data, 47 percent of the expected net income of \$0.908 million would be covered by stabilization programs. This compares unfavourably with the situation after the change when 63 percent of the expected \$1.476 million would be covered.



The graph demonstrates the impact of commodity based revenue stabilization programs. Irrespective of the level of coverage that is provided, they encourage farmers to expand the area farmed and to intensify the use of inputs of chemicals and farm machinery by reducing the level of net income risk as these inputs increase. They can thus discourage practices that would lead to reduced levels of soil and water degradation, as well encourage, first, the conversion of habitat and permanently covered lands into crop land, and, second, the increased consumption of non-renewable energy. At the same time, they also can act as a constraint to farmers wishing to change practices so as to reduce the environmental impact of their operations.

In other words, for farmers adjusting production practices, publicly subsidized programs will amplify the impact of declines in market prices and declines in yields caused by weather events compared with those continuing to practice more conventional techniques.

The impact of commodity price and yield (crop insurance) stabilization programs: part two

The alternative to offering farmers income security based on market prices and yields for individual commodities is to provide a program that stabilizes net incomes directly. The actual mechanics of such a program are under discussion at the minute and have resulted in the announcement of a Net Income Stabilization Account (NISA) Program. This section discusses the broad concept and environmental advantages of an income stabilization program which is not based on a restricted range of commodities.

To begin, assume that such a program provides the same 90 percent coverage as the previous discussion of price and yield stabilization programs. The same example of Ontario as a whole farm will be used, except for the addition of a pessimistic and an optimistic estimate of the impact of conservation practices. The former assumes that a 10 percent reduction in yields following the adoption of conservation practices is permanent. The latter assumes that the 10 percent reduction lasts for 3 years, and that in Year 4 only a 5 percent reduction is experienced, and in Year 5 and beyond no reductions occur.

The net income coverage for the tillage alternatives through time are given below, assuming that the coverage remains at 90 percent and there are no temporary variations in yields and prices during the ten year period.

Year	Production method		
	Conventional	Conservation	
		Pessimistic	Optimistic
1	1328	1328	1328
2	1328	1232	1226
3	1328	1136	1124
4	1328	1040	1040
5	1328	944	955
6	1328	848	1001
7	1328	848	1103
8	1328	848	1206
9	1328	848	1308
10	1328	848	1359
	13280	9920	11650

Pessimistic estimate: Average decline in coverage per year with conservation practices = $(13280 - 9920) / 10 = 336$

Optimistic estimate: yields in fact improve back to levels in Year 0 by Year 5 = 163

A net income stabilization program, while not shielding a farmer adopting conservation practices from declines in yields, would offer a greater level of income guarantee than one based on stabilizing prices and yields of specific

commodities. At worst a farmer would only receive a coverage of 90 percent of net income, and that only after five years compared to 29 percent with the latter type of program.

The costs of governments providing an incentive so that farmers were not penalized for adopting conservation practices would be accordingly less, and probably within the bounds of the public off farm costs of soil and water degradation from conventional practices. Such a public subsidy may not have to be permanent, given the increased profits a farm can expect under the optimistic scenario after five years. In other words it would only be necessary to offer a subsidy for Years 2 through 4 or 5.

The table below compares the minimum net cash income that would be provided under various levels of coverage for a net income stabilization program with that expected for a price support and crop insurance based set of programs. The optimistic scenario is used.

Year	Net revenue coverage			Commodity-based	
	90%	80%	70%	90%	80%
1	1328	1180	1033	908	375
2	1220	1084	949	801	284
3	1124	999	874	695	193
4	1040	924	809	588	102
5	855	760	665	544	57
6	1001	890	779	551	57
7	1103	980	858	664	148
8	1206	1072	938	778	329
9	1308	1163	1017	891	329
10	1359	1208	1057	942	375

Payouts for Years 2 to 5 in order to maintain net income levels for conventional practices

1073	954	835	1004	728
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This table demonstrates that even a 70 percent coverage rate on a net income program would provide the farmer with better income coverage than a 90 percent coverage commodity-based set of programs if (s)he changed from conventional to conservation production practices. Furthermore, if the Province wished to offset income losses during Years 2 to 5 of adoption, it would cost less to provide this using a net income rather than commodity specific approach. A commodity based program offering an 80 percent coverage could save public funds but only at the risk of lower levels of farmers' participation, as such a program would offer a lower level of income support over the transition period compared with that for conventional practices.

The impact of commodity price and yield (crop insurance) stabilization programs: part three

This section addresses some of questions regarding the impact of stabilization programs. The two types are simply differentiated as commodity-based or net income-based, or combined as stabilization programs.

Do stabilization programs encourage more land in intensive agriculture than would otherwise be the case?

This is not entirely clear. In the long run, a farmer's marginal returns, if the coverage is 90 percent, will begin to decline when the change in expected market-sourced revenue divided by the marginal change in costs is 1.11. This should discourage farmers from expanding their production beyond what would be economically rational from their expected revenues. At the 80 percent coverage level the corresponding marginal change is 1.25.

On the other hand, we can also expect, in the absence of any stabilization programs, that revenues will be more variable as the intensity of inputs increase and the level of product diversification decreases (see later). Stabilization programs then will go some way towards encouraging a higher intensity of inputs, including land, because they reduce this variability. Commodity-based programs in particular have the rather illogical characteristic of reducing levels of net income security when they are likely to be less variable relative to higher intensity production systems, where a greater security of net income is guaranteed.

Stabilization programs also limit the sensitivity of farmers to changes not only in prices but in yields. This is not a useful characteristic if Ontario wishes to rely on market-type mechanisms to reduce the prevalence of farm-based environmental degradation. In this regard, the use of a 15 year moving average to calculate minimum revenues in GRIP needs to be critically evaluated. It makes the coverage more similar to a net income program when farmers are considering a change to conservation production practices resulting in a reduction in yields and net incomes. But it only achieves this at the expense of sheltering the farmer for a considerable period of time from the positive and negative effects of changes in market prices, and from changes in yields resulting from soil degradation.

Do stabilization programs increase farm specialization?

Commodity based programs will unless all commodities are covered. In Ontario, price stabilization programs cover most marketed crops. The missing, marketed crops only

account for a relatively small acreage. Although one can argue that feed crops are covered through livestock stabilization programs that include a costs of production adjustment as well as coverage based on livestock prices, no coverage of crops used as green manures, cover crops, etc. is provided. This means that the farmer has to cover the full risk of these crops at the same time as returns for alternative marketed crops are offered publicly subsidized revenue security which increases the more intensely they are grown.

A net income program would to some significant extent offset these perverse tendencies in commodity programs.

Do stabilization programs contribute to the degradation of the environment?

Commodity-based programs do by favouring the production of marketed products. Since stabilization coverage for red meats was introduced later than coverage for crops, today's agricultural landscape reflects the divorce of livestock and crop production this has encouraged. A mixed livestock and crop farm has a better base from which to maximize the use of biological inputs in food production. Specialization has also encouraged the centralization of animals resulting in a considerable point source pollution problem surrounding many animal-based operations.

Not only do stabilization programs in general reduce the risk from specialized and intensive production, but these programs encourage a more intense form of production per unit area than would otherwise be the case. This has a number of aspects. First, otherwise marginal areas on the farm are brought into production instead of remaining in permanent vegetation cover and acting as barriers and filters for soil and water degradation. Second, a more intensive use of inputs is encouraged. The extent to which this would be offset by a fuller cost accounting of these inputs should be analyzed. It would seem preferable to offer income protection through an income-related program rather than indirectly through the subsidization of inputs which can be environmentally unfriendly.

A strong case can be made for protecting many natural areas in Ontario. Whether this can be done most effectively through regulations prohibiting conversions, or through cross-compliance requirements in stabilization and other programs must be investigated. Cross-compliance regulations are used in the U.S. to protect natural areas – no commodity price support payments are available after such areas are converted to other farm uses.

Conclusion 2

It is more desirable to offer farmers income support through programs directly stabilizing incomes than reducing prices of energy-based inputs. It may, also, be advantageous to consider ways of reducing the costs of land relative to commodity prices. The Province and the Federal Government should also revise their strategy towards land improvements on farms so as to prevent a further decline in the supply of important natural areas.

Inputs based on non-renewable energy are one of the sources of water degradation and for much of the long run lack of sustainability of the sector. It would be preferable if income support is not partly offered to farmers by reducing the costs of these inputs. Presently, farmers do not pay provincial sales tax on such inputs and also receive a tax rebate on fuels used to power farm machinery. It seems to be the only industrial sector so treated in Ontario. The resulting subsidy amounts only to some \$67 million in 1989, or about one percent of farm operating expenses. However, combined with expected increases in energy prices over the next few years, removing this subsidy would provide a signal that is consistent with the directions the Province should want the sector to move. It would encourage the adoption of practices using reduced tillage for crops – see the following information box for an example of the types of changes that could be brought about in tillage for corn. Lower tillage would not only reduce energy consumption, but also reduce risks of soil and water degradation.

The increasing rates of adoption of reduced tillage practices is at least partly a response to the poor economic conditions of farmers. A key concern of governments should be to maintain the economic attractiveness of reduced tillage practices irrespective of commodity prices. It is important to avoid a repeat of the situation of the 1970's and early 1980's when commodity prices were high both absolutely and relative to energy-based prices. Ensuring a higher real price for energy-based inputs may be a sufficient answer, but thought must be given to offsetting the negative impact of a considerable improvement in commodity prices from today's extremely depressed levels.

One method could be to introduce cross-compliance requirements into farm income support programs. These would make eligibility to participate in programs dependent upon farmers using low tillage methods. How this could be done easily and effectively is not entirely clear. Another way, suggested by the example provided in the information box on page 31, is to encourage the evolution of farm structures so that an operator's labour becomes the constraint determining operations. Some options which come to mind, not all of which are necessarily equitable, efficient or socially acceptable in today's circumstances, are policies and programs to:

The Impact of Input and corn prices on the adoption of conservation tillage practices

Compared with conventional tillage based upon the moldboard plough, reduced tillage techniques offer decreases in costs for labour, fuel and farm machinery. The economics of four different cultivation techniques for grain corn on a 'typical' large cropping operation in southern Ontario have been analyzed by Stonehouse (1991). Using his data, we have inferred the impacts of changes in the prices of commodities and inputs on the net farm incomes generated by the four approaches. Note the data imply that reduced tillage does carry a yield penalty, and no tillage increased herbicide costs. These have not always been the long run experience of farmers adopting the techniques, so this information box may provide a pessimistic assessment. However, it must be noted that these practices require a high level of management and well drained soils – the latter, in particular, restrict their adoption in the eastern and northern agricultural areas.

The net returns to the operator's labour were calculated from Stonehouse's data using various price changes. The original paper had used a corn price of \$159 per tonne. The results using this and other prices are given below in net cash returns per hectare. The input prices referred to encompass fuels, fertilizers, herbicides and insecticides. The small numbers indicate the rank order by net returns of the alternative tillage methods.

	Conven- tional	Reduced conven- tional	Full width no plough	No tillage
\$159 corn				
No change in input prices	444.35	427.27	432.80	351.19
	1	3	2	4
8 % increase in input prices	428.83	410.14	424.66	333.84
	1	3	2	4
16% increase in input prices	413.92	393.01	416.52	316.49
	2	3	1	4
24% increase in input prices	399.01	375.88	408.38	299.14
	2	3	1	4
\$120 corn				
No change in input prices	216.40	210.48	204.89	131.78
	1	2	3	4
8% increase in put prices	201.53	192.87	195.63	114.39
	1	3	2	4
16% increase in input prices	186.62	175.74	187.49	97.04
	2	3	1	4
24% increase in input prices	171.71	158.61	179.35	79.69
	2	3	1	4
\$100 corn				
No change in input prices	85.04	79.08	73.49	13.58
	1	2	3	4
8% increase in input prices	70.13	61.47	64.23	-3.81
	1	3	2	4
16% increase in input prices	55.22	44.34	56.09	-21.16
	2	3	1	4
24% increase in input prices	40.31	27.21	47.95	-38.51
	2	3	1	4

Increases in input prices and decreases in

commodity prices both make non-conventional conservation tillage financially more attractive relative to conventional ploughing. These conservation practices are sensible in Canadian situations because they require fewer field operations in spring than conventional approaches. There are frequently very short time periods of time to complete field operations at this time of year

If the operator's labour input is not a constraint, it is interesting to compare the net returns per hour of the farmer's time. The labour inputs for non-conventional practices are less than for conventional practices, so that the relative attractiveness of the approaches is different if this criteria is used:

	Conven- tional	Reduced conven- tional	Full width no plough	No tillage
\$159 corn				
No change in input prices	444.35	534.09	554.87	900.49
	4	3	2	1
8 % increase in input prices	428.83	512.68	544.46	856.00
	4	3	2	1
\$120 corn				
No change in input prices	216.40	263.10	262.68	337.90
	4	2	3	1
8% increase input prices	201.53	241.09	250.81	293.31
	4	3	2	1
\$100 corn				
No change in input prices	85.04	98.85	82.34	34.82
	2	1	3	4
8% increase in input prices	70.13	76.84	82.35	-9.80
	3	2	1	4

Conclusions from this data:

1. Where the operator's time rather than the size of the farm constrains the farm business, conservation tillage techniques offer significant economic advantages over conventional practices. No tillage, however, is a losing proposition when commodity prices are very low, and, consequently, is not as attractive as other practices for today's markets.
2. Where the farm size rather than time inputs is the constraining factor on operations, conventional ploughing remains the most financially attractive practice unless prices of energy-based inputs increase substantially. No tillage is never a financially attractive alternative.
3. It is likely that reduced conventional or full width no plough would provide better balance of reduced levels of soil and water degradation than conventional tillage. In which case, public subsidies of energy-based inputs may be misplaced, and it may be advantageous to encourage an increase in farm size until the operators' labour input become a constraining factor in the farm enterprise.

- reduce the cost of farmers purchasing additional land for farm production,
- encourage other farmers to sell land,
- tax farm income on a fixed, rather than increasing, percentage basis,
- regulate the sale of energy-based inputs, perhaps requiring them to be available only to farmers holding marketable purchase quotas originally issued free to farmers by the Province.

If this same example, is anything to go by, the adoption of reduced tillage will also be encouraged by a growth in farm size. This is already occurring, but the Province should investigate whether this trend is being constrained by the current economic conditions, and by land prices in particular. There may be a case here for offering reduced rates of interest for credit used to set up larger farms using reduced tillage methods. It may also be possible to link this cheaper credit to the provision on farms of other environmentally desirable practices on farms, such as the provision of habitat for wildlife.

If it were decided to end tax concessions on their energy-based purchases, farmers could be provided with the same level of income support through a transfer of the revenues involved to cover premiums on a comprehensive net income stabilization insurance program. There may also be other uses for the funds that would be equitable for both farmers and the environment.

Given the poor market conditions and no evidence that Canada will be well placed to address any future shortages in world food supplies, both senior levels of government should critically review the support that they offer to farmers for land improvements. There is no need to discourage improvements that increase an individual farmer's productivity without any significant environmental damage. However, it is not clear why governments should provide financial support for investments that result in mostly private gain. A number of reports have shown that there is only a very limited net public gain from such programming (see, for example, Cecile et al, 1985, Bardecki, 1988 and van Vuuren, 1986).

Many land improvements have resulted in significant environmental costs, mainly from losses of natural areas and habitat for certain natural species caused by both conversion of land to farm uses, and from alterations in stream flow and water quality (see, for example, a study of wetland losses in Ontario – Snell, 1987). They should not only not be encouraged by programs, they should be actively discouraged, if for no other reason than the resulting production becomes eligible for subsidized farm income stabilization and supply management programs. These programs make such investments more profitable than under a 'free' market system.

The simplest way of avoiding this would be to pass regulations making such farmers or areas ineligible for program support more generally. This would be similar to the 'swamp buster' regulations used in the U.S. for a number of years (Girt and Associates, 1992).

Conclusion 3

The Provincial and Federal Governments should conduct a careful review of supply management systems which incorporates environmental considerations

Farm production of dairy products, eggs, chickens and turkeys are controlled by supply management régimes, the environmental impact of which are not completely clear nor likely consistent between the commodities involved. Taking the products one at a time, in the case of dairy :

1. By supporting relatively small enterprises, supply management has provided a livestock base for a relatively diversified farm growing feeds and other crops in rotations and using manures. However, it is not clear if dairy operations, except from being larger, would be any less diversified under freer marketing conditions;
2. There is a chronic problem not only from pollution from animal wastes but also pollution from wastes used to clean milk handling equipment on the farm, and it is not clear that economically feasible control options exist for all dairy farmers.

Dairy farming is a highly regulated industry. There is no reason why the inspectors used to promote and ensure quality of product could not also enforce environmental requirements for the handling of wastes. In Canada, according to the methodology used to infer producer subsidy equivalents designed by the OECD, supply management provided the equivalent of subsidies over and above about 80 percent of the 'free' market price for milk in 1990 (Agriculture Canada, 1991). It is not at all clear why governments should not use this contribution as a lever to improve environmental management, when any increase in farmers' production costs could be offset by the consumer price for dairy products.

Supply management for other products has tended to allow for the growth of large specialized enterprises which may or may not also produce a range of crops for use as feed. The income effects of these supply management régimes for participating farmers are less than for dairy production but still, depending on market conditions, can account for up to 40 percent of the value of gross market returns. Again where pollution problems associated with animal wastes exist, a strong case for cross-compliance can be made, and subsidies would not be provided to those causing such problems.

The implications of introducing a net income stabilization insurance scheme not based on commodities to supply management arrangements must be clarified. Its introduction will require that regulations governing supply management, particularly, commodity price formulas, be changed. Since supply management is inconsistent with freer trading arrangements, reviewing the policy would seem an appropriate action on more than one front.

Conclusion 4

There is a need to deliver farm programs according to ecological as well as market requirements

A net income stabilization program and abandonment of subsidies on energy-based farm inputs would provide a more adequate provincial-level support framework for the sustainable development of the farm sector. However, a number of other programs need to be delivered to reflect local environmental conditions if they are not to be unnecessarily restrictive on production options for farmers or allow for environmentally unsustainable practices. Improved standards for farm planning, and evidence that farmers are managing their land use in an environmentally sensitive manner should become important eligibility criteria for a whole range of programs, such as Ontario Farm-Start, Operating Loan Guarantee Program, Ontario Young Farmer Credit Program, Ontario Red Meat Development Program, Ontario Pork Industry Improvement Plan, and loans under the Tile Drainage Act.

The Province's farmers have already shown a very positive response to pesticide management training programs designed for farmers. This experience should lead the Province to maintain the momentum by offering similar programs for the management of soil, water and habitat resources. A number of other public and private agencies could be co-opted for this initiative, such as the Ontario Ministry of Natural Resources for forestry holdings on farms and for wildlife habitat, and such agencies as the Ontario Federation of Anglers and Hunters, and Ducks Unlimited.

Should such programs prove successful, the Province would have strong grounds for insisting on adherence to environmental guidelines as a condition for eligibility in all programs. It would not be necessary for the Government to write the guidelines independently. They would be more effective if they were written by representative farmers in consultation with academics, representatives of other interests in the countryside as well as governments. Since these guidelines would have to be sensitive to local conditions, they would require considerable local input. The Province should build upon the apparently successful experience of using farmers through Soil and Crop Improvement Associations to deliver the Land Stewardship Programs.

and promote the continued development and participation of such groups in initiatives to improve the standards of management of the environment.

Conclusion 5

For environmental and economic reasons, the Province should encourage the diversification of income sources for farmers.

Diversified production will bring with it a measure of income security and less environmental stress. So far we have concluded that the Province should introduce a net income stabilization program, and that it should be supplemented by actions that define eligibility for programs partly on the basis of the environmental desirability of the methods used to grow and to raise livestock. In addition, the Ontario Ministry of Agriculture and Food should take all necessary actions to facilitate income transfers to farmers for the supply of environmental goods and services, such as wildlife, recreation trails and aesthetically pleasing landscapes.

Some of the options involved, in a largely Prairie context, have been discussed elsewhere (Girt, 1990). Funds from such sources may be the only really new sources of revenue available for farmers in the foreseeable future. Some of the sources have considerable budgets to disperse, at least in relation to their targeted farm populations – for example, funds identified under the North American Waterfowl Management Plan for Ontario.

Up to now the delivery of information as well as programs directed towards the management of natural areas on farms and the provision of habitat for non-commercial plants and animals on farms has been left to non-agricultural agencies. This may have been understandable when farmers could sell their production at reasonable prices, and when environmental concerns were less developed and less well known. As this no longer the case, such a commodity focussed mandate for agricultural agencies helps to maintain a bureaucratic barrier between interests in non-food items and the supplier of the natural resources they need. A more integrated approach towards land stewardship in Ontario must be developed, and one that recognizes the lead role that farmers and their agencies can play in reducing farming's environmental impact positively using economic incentives rather than inefficient regulation. One such proposal has been recently formulated (Girt and Goodwin, 1991)

Conclusion 6

A new set of objectives and a stronger commitment to addressing environmental issues are required to guide the setting of federal and provincial policies and programs for Ontario's farm sector.

Over the past few years there has been a distinct change in how the environment is addressed in forums on agricultural policies. The older approach was never clearly articulated. It basically arose from a feeling that degradation of the environment could not legitimately be linked to agriculture. Others thought that if it could then any environmental damage was for a legitimate reason, to produce food in short supply. Under these circumstances it was felt that the most effective way of addressing it would be through a rather passive, adoption of innovation model. Programs could be designed to encourage the development of preventive technologies and improved communication of results to farmers, leading to increased rates of adoption. Thus research on and off the farm, plus communication of the results would be the key.

The feeling now is beginning to change. Much of the focus of this change has been reflected in the various policy review consultative exercises instigated by the Federal Department of Agriculture, following publication of a new federal position on agriculture policy (Agriculture Canada, 1989).

This position in fact did not enunciate a new, implementable policy, but rather established the need for and the ground rules for a policy review. The review was needed not only because market conditions had changed, but so had technologies, the needs of the farming community, and because of the need to conserve natural resources for agriculture. On the latter point, however, a considerable shift in focus had begun to occur. The point was not only did the resources need to be conserved for agricultural production, but so that other uses of the same resources could continue to receive benefits from them as well.

Although this shift is only beginning to legitimize the presence of non-agricultural interests in policy discussions, it should produce a fundamental shift in the way policies are designed and implemented. The Provinces and the Federal Government have agreed to use four principles as the common ground for future policies. They are:

- More market responsiveness – world wide changes in production capabilities and in the demand for food will not mean that farmers can continue to expect to sell whatever is produced. This increasingly competitive environment will likely be an economically freer one as well, through such arrangements as the Canada-US Trading Agreement and satisfac-

tory resolution of the GATT impasse on agricultural trade.

- Increased self-reliance of the sector – policies will be changed so that any support that is given does not mask market signals. This implies that support programs should be designed to protect farmers from uncertainty and sudden shifts in market conditions, and from the effects of irregular natural hazards, but that they should not constrain adjustments to longer run trends.
- National policies which recognize regional diversity .
- Increased environmental sustainability.

The key point is that future policies, it has been agreed, should be based on these four principles. This will be a challenge if for no other reason than the principles themselves will not always be compatible. For example, revising Western Grain Transportation Policy to encourage crop diversification in the Prairies in support of environmental objectives for that region, may only serve to further the decline in beef and hog production in Eastern Canada, including Ontario. This in turn may lead to increased rates of environmental degradation in the East, unless steps are taken to discourage the conversion of land in perennial forage to cash crop production.

The major gain from this new policy review has been that the environment is beginning to become an integral part of agricultural policy considerations, rather than being treated as a residual, add-on. For example, the Federal-Provincial Agreements on GRIP contain clauses requiring:

- completion of an environmental assessment within two years of the Agreement coming into effect on the need for amendments to the Plan, mitigation measures, cross-compliance and environmental regulations;
- and subsequently the development and implementation of conditions under which eligibility to the Program can be withheld, restricted or advanced in order to protect the environment and to encourage management practices to ensure environmental sustainability.

As another example, the Federal-Provincial Safety Net Committee of which Ontario was a member has also provided some analyzes and recommendations to Ministers of Agriculture with respect to the potential impact of programs on the environment (Agriculture Canada, 1990b). Their conclusions, particularly on stabilization programs, are consistent with, but not carried to the same depth, as this study.

Earlier this year the Ontario Ministry of Agriculture and Food established an Environmental

Responsibility Team. Its recommendations (Ontario Ministry of Agriculture and Food, 1991) are to be integrated into the workplans of the agencies divisions and branches. The operating principles being adopted are as follows:

1. '... anticipating future environmental issues and taking action to conserve and enhance the environment.....
2. a systems approach to the efficient use of resources
3. long-term integrated and informed decision making across the agriculture and food system' (Ontario Ministry of Agriculture and Food, 1991, page 2).

Their effectiveness will, of course, depend upon the Agency's commitment to them in the long-term and in its operations as opposed to policy statements. Some critical comments on the document as a whole are in order, though it must be noted that they may be more the result of wording than intent.

Although the document stresses the need to involve stakeholders in all facets of OMAF's work, the participation of non-agricultural stakeholders appears to be limited to that which will flow through inter-departmental meetings of senior officials. This seems inadequate if a spirit of cooperation between all stakeholders over natural resources is to be promoted. The management of natural resources is not something that can be implemented centrally – the mixes of issues are geographically very volatile. Therefore, some decentralized, multi-stake holder consultative and delivery process must be developed (Girt and Goodwin, 1991). This runs somewhat counter to what has been the typical practice of OMAF. Even its Land Stewardship Programs are offered provincially even though the issues they are designed to address tend to have geographically varying significance.

The new programs being considered by O.M.A.F., such as those under 'Project Green Farm', tend to be incremental, subsidy and research/promotion exercises. Discussions of the whole area of adjusting existing policies and the development of economic development strategies for the sector with environmental concerns as an equal consideration to support for marketing and farm income in the document seems to lack any conviction and direction. The next chapter describes some policy options which could result from a more completely integrated perspective on the farm sector's development.

Chapter five

Options for making Ontario's farm support programs supportive of conservation objectives

This analysis is aimed at the macro-level situation in Southern Ontario, and focuses on the major land uses in agriculture – corn, soy bean, small grains, hay and livestock production – as well as on some ways of incorporating environmental considerations into the strategic planning for agriculture in the Province. The major conservation relationships considered are as follows:

1. In terms of soil erosion potential the main field crops are ranked from low to high in the following order: hay, small grains, soy, and corn.
2. Water will be polluted by sediment containing nitrates, phosphates and pesticides that runs off from fields, as well as by chemicals infiltrating ground supplies.
3. Nitrates and phosphorus can be sourced from chemicals or by natural processes such as green manuring, and from animal wastes.
4. Reduced tillage methods can reduce run off from fields, but not necessarily reduce water pollution since the techniques frequently utilize chemicals that will occur in greater concentrations and greater absolute amounts in the run off that does occur. They also may not make any significant contribution towards reducing the pollution of ground water. Diversification of crops in an area of reduced tillage can help prevent high water pollution loadings through diversifying timings and types of application of chemicals to fields.

A number of 'conservation objectives' can be identified for farming:

1. Increasing the organic content of soils as a means of increasing the innate fertility would reduce soil and water, and improve plant yields because there would be less soil compaction and more water retention, thus reducing the impact of drought. The amount of carbon 'fixed' by farming into the soils would also increase to offset the sector's contribution to atmospheric CO₂ from the consumption of hydrocarbons, the clearing of woodlands, composting, and from animal production. There could be competitive advantages in that

the costs of fertilizer use could be reduced.

2. Reducing water pollution would lessen the risks to humans of contamination of water supplies, improve wildlife habitat in general through the protection of key areas affecting the food chain – surface waters and wetlands.
3. Reducing soil erosion would maintain production potentials for future generations, avoid reductions in crop productivity, lessen water pollution somewhat, and diminish the costs of maintaining waterways and other engineering structures which attract sediments.
4. The environmental benefits of retiring fragile lands are partly covered in the previous objectives but it is entered separately because there are lands that because of their fragile, non-agricultural characteristics must be protected from agriculture, such as wetlands and areas of critical natural importance adjoining farmed areas.
5. Maintaining and improving wildlife populations will require not only careful management of farm land that is not used to produce crops, but also attention to the methods of growing crops since the wildlife food chain includes invertebrates which live in fields – reduced tillage and reduced use of pesticides will be of great assistance here.
6. Reducing agriculture's dependency on non-renewable sources of energy will not only reduce the use of chemicals which can cause pollution and destruction of non-threatening organisms, but also limit the sector's contribution to global warming and conserving supplies of non-renewable energy.

The table on page 45 summarizes how effectively these objectives can be achieved using the relationships between land use and use of inputs, and conservation issues discussed earlier. The following points must be understood in interpreting the table:

1. The table outlines some possible strategies which can be addressed using some of the major programs or non-environmental policy issues current in Ontario.
2. Some of the possible means or policies/programs governments could use to achieve each strategy are shown in the second column.
3. The production shifts that are likely to be produced are shown in the next major column labelled 'production change'. Note that only those with a direct link to conservation changes

shown in the next column are included.

4. The symbol ✓ is used to indicate that the change shown in a column heading is thought likely to occur, NA is used to indicate a tautology where the strategy and the change are one and the same, ✗ is used to show that the opposite, and undesirable effect is likely to occur, and ? is used to show that the effect is not clear or that there is not likely to be any effect whatsoever. The final set of columns simply sums the number of symbols for a strategy - it is thus an indicator of how comprehensive and positive the effect of a particular strategy on the complete set of conservation changes sought is likely to be.
5. The first strategy would be to allow for the convergence of chemical prices relative to prices for field crops. This is effectively already occurring due to world grain prices and the increase in relative value of the Canadian dollar over the previous few years. The effect on the farm community was as expected - a some reduction in the consumption of chemicals has occurred (Graph 5 on page 54). Other means of realizing the same type of effect, but by deliberate and unilateral action by Ontario Government, would be to remove tax concessions granted to farmers on the purchase of these inputs, and to effectively reduce crop prices by increasing production risk through a withdrawal of market price and yield stabilization programs. This is not meant to suggest that such moves should occur without compensation in the form of offering other means of income support. Some options have already been discussed. Such a move would, however, reduce the market dependency of the current shift in consumption of inputs.

The effect of such a strategy would be to reduce the profitability of corn which is heavily dependent on fertilizer and pesticide inputs. So is soy, but its nitrogen fixation properties may offset this. Reduced tillage would increase. Empirical evidence points to a decrease in pesticide use. Accepting this empirical evidence, this strategy's overall conservation impact would be positive on all objectives but the protection of fragile lands.

6. Strategy #2 simply takes aim at corn production. It is much less effective, only benefitting three of the six conservation objectives. It would also be very difficult to compensate corn growers for the loss of stabilization programs without offering incentives to produce another crop, perhaps to the detriment of farmers already producing it.
7. Strategy #3 takes a popular conservation farming approach, reduced tillage, and increases its rate of adoption either through making its adoption a condition of eligibility for other programs (ignoring for the purposes of this exercise how this could be done), and/or by

offering an incentive for its adoption, perhaps an incentive towards the capital costs involved. It produces the desired result on four conservation objectives, but may not reduce farming's negative effects on water systems.

8. Strategy #4 is similar to #2, but for small grains. It is also interesting because it represents a federal policy shift in the 1980's which removed a higher domestic price for wheat. Even though the shift allowed domestic consumers to benefit from lower world grain prices, it increased the relative attractiveness of growing more erosion-producing corn and soy beans in Ontario. The introduction of GRIP has offset the financial impact of the change for a number of years because this program offers a minimum price based on a 15 year average. This effect is ignored in the Table.
9. Strategy #5 reflects the barrier economically inaccessible processing facilities present to the introduction of corn-soy based rotations into some areas where corn is the dominant crop, for example, Eastern Ontario. Encouraging the establishment of such facilities would provide the market basis for production systems that would cause less soil erosion and, because of this and the lower use of artificial inputs of nitrogen, leading to less water pollution, particularly of ground water.
10. Strategy #6 reflects the current difficulties for cattle producers in particular, who are finding market conditions very difficult, particularly in the face of lower costs of production in the Prairies and the Western U.S. because of low world grain prices. Any move to change the method of payment for the transport subsidy on Western grains (the 'Crow Rate') and for the Federal Government to pay the producer, as some Prairie farm and economic development interests would prefer, would reduce the competitiveness of Ontario's livestock industry. This in turn could reduce the supply of organic matter for Ontario's soils and reduce levels of diversification of land use. As a consequence any reduction in water pollution from livestock sources could be offset (extent is unknown) by increased soil erosion and a decline in organic matter.
11. Strategy #7 would reflect the fact that public support programs that are delivered on the basis of commodities grown encourage the use of more land than would otherwise be the case. They also provide a disincentive for production of forage and other non-marketed crops which are important for diversification and reductions in the consumption of non-renewable energy by farms. The alternative strategy would provide for a stabilization of farm incomes, no matter what its source.

Governments and the industry are already considering a proposal for a new income stabilization program, referred to as NISA. As it is being introduced for a limited range of commodities, this reduces its environmental effectiveness, even though NISA was originally proposed to be non-commodity specific. It should also be noted that under current GATT rules, commodity-based stabilization programs can be considered a potentially trade distorting subsidy, whereas a NISA-type of program would not.

- 12.Strategy #8 is already being practiced under the Canada-Ontario Agreement on Agricultural Soil and Water Conservation. Such programs would benefit objectives for habitat, fragile lands and the removal of lands prone to the more dramatic as opposed to insidious forms of soil erosion.
- 13.Strategy #9 would attempt to provide incentives for diversification of production directly rather than indirectly as through net income stabilization programs. Farmers eligibility for support programs would depend on their adoption of a mix of crops reflecting what is considered to be a sustainable production under local conditions. An incentive would be provided for those who diversified and/or a penalty for those who did not. The appropriate crop mix could be determined by a code of production practices established by a committee of farmers' peers from within the industry and from other stakeholder groups.
- 14.None of the above strategies taken individually would make a positive contribution to all six conservation objectives. The last three strategies considered are combinations of two of the former objectives. Only one of these of all the 12 strategies considered would make a positive contribution to all objectives - a combination of replacing all stabilization programs with one based on net income and the use of cross-compliance.

The challenge in implementing such a program would be to make it economically attractive enough for the majority of farmers to participate. Two moves would help in this regard. First, the Ontario Government should make it a legal requirement that all farm income support in the Province must be delivered through the new net income stabilization program. Also, this type of support to offset unforeseen circumstances could be still provided but only through an active account with the administrators of the stabilization program. Second, the strategy of withdrawing from input subsidies on chemicals (Strategy #1) could also be adopted. The money's 'saved' could be used to supplement the Provincial share of the premiums for the stabilization program – farmers would not lose the generally available subsidy as long as they participated in the program.

In terms of general policies that would provide a supportive framework for all six conservation objectives, a combination of:

1. Removal of input subsidies on purchased chemicals.
2. The introduction of an income stabilization program based on realized farm income rather than the production of specific commodities.
3. Delivered with cross-compliance requirements which could incorporate incentives to use lands for other uses such as wildlife habitat if the benefitting groups were willing to make a contribution towards costs (perhaps taking a share of contributions towards NISA in relation to the cross-compliance requirements it contains).

would seem to be potentially the most effective.

Strategy	Possible means of achieving result	Production change					Conservation change							Conservation score		
		Less Corn	More Soy	More Diversification	Less Pesticides	More Reduced Tillage	More Organic Matter	Less Water Pollution	Less Soil Erosion	Retire Fragile Lands	More Wildlife Habitat	Reduce Non-Renewable Energy Consumption	✓ NA	✗	?	
1. Increase prices of chemicals relative to field crops	Remove tax exemptions Increase production risk of field crops by removing price and yield stabilization programs High Can\$:US\$ exchange	✓	?	✓	✓	✓	✓	✓	✓	?	✓	✓	5	0	1	
2. Declining corn prices	North American market price Removal from stabilization programs	✓	✓	✓	?	?	?	✓	✓	?	✓	?	3	0	3	
3. Increased adoption of reduced tillage	Capital purchase incentive Cross-compliance	?	?	?	✗	NA	✓	?	✓	?	✓	✓	4	0	2	
4. Declining price of small grains	Removal of 2-price wheat Removal from stabilization programs	✓	?	✗	?	?	?	?	✗	?	?	?	0	1	5	
5. Increased prices for soybeans	More processing facilities	✓	✓	✓	?	?	?	✓	✓	?	✗	?	2	1	3	
6. Declining sales and prices for livestock	Loss of processing facilities High Can\$:US\$ Revise "Crow Rate" formula.	✓	?	✗	?	?	✗	✓	?	?	✓	?	2	1	3	
7. Introduction of farm rather than commodity-based income support	Replace yield and commodity price stabilization programs with net revenue-based programs	✓	✓	✓	✓	✓	✓	?	✓	?	✓	✓	4	0	2	
8. Reduce farm land area	Land retirement incentive	?	?	?	?	?	?	?	✓	✓	✓	?	3	0	3	
9. Diversify land	Cross-compliance	✓	✓	NA	?	?	✓	✓	✓	?	?	?	3	0	3	
10. Combine introduction of farm rather than commodity support with efforts to increase adoption of no till	See #3 and #7	✓	✓	✓	✓	✓	✓	?	✓	?	✓	✓	4	0	2	
11. Combine introduction of farm rather than commodity support with efforts to diversify land use	See #7 and #9	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓	6	0	0	
12. Combine introduction of farm rather than commodity support with increase of price of chemicals rel. to field crops	See #1 and #7	✓	✓	✓	✓	✓	✓	?	✓	?	✓	✓	4	0	2	

Alternative policies and strategies for making Ontario's farm production more sustainable

Chapter six

Summary of conclusions and recommendations

1. Agricultural activities are very considerable human-made intrusions into natural systems and no doubt many of the environmental problems associated with farming have been occurring since the sector began to cut down trees for farming some 150 or more years ago. However, the current level of concern about farming's environmental impact is greater than it has ever been for a number of reasons:
 - increased awareness of problems, and a well informed and more demanding public with respect to the supply of good quality water, quality foods with minimal perceived chemical contamination, habitat for wildlife and flora, and the preservation of somewhat intangible aesthetic characteristics for quality of life and recreation.
 - adoption of crop production techniques that result in greater runoff of contaminants into water systems than was previously the case,
 - numbers and geographic concentrations of livestock with the concomitant waste handling challenge to avoid pollution,
 - negatively synergistic effects of declines in the quantity and quality of habitat for wildlife and flora,
 - bioconcentration of pollutants in the food chain,
 - physically based concentration of contaminants in major rivers and, particularly, the Great Lakes,
 - increasing focus within farms on using land for annual crops and the decreasing importance of perennial forages,
 - emerging concerns over policy inconsistencies - agricultural policies are not well understood and subject to little critical review by the general population, but wildlife and other ecologically oriented groups have for a number of years voiced concerns over the ease and extent to which natural areas, such as wetlands, have been converted into farm land with the support of subsidies.
2. Agricultural policies were broadened and strengthened in Canada during the 1960's and

1970's in order to promote a fair return for farmers. This was to provide them with a measure of income security against short term variations in yields, caused by natural factors, such as droughts, frosts and excessive rains, and declines in market prices. The subsequent and unexpectedly large declines in commodity prices, rapid convergence of commodity prices and input costs, and increases in real interest rates have resulted not only in financial stress for farmers, but in an unexpectedly high level of public expenditures directly supporting farm incomes in Ontario and throughout Canada. The result has been that transfer payments and payments from publicly-subsidized yield and price insurance schemes now account for almost 50 percent of net farm cash incomes. In addition, the income enhancing effect of input subsidies realized through tax concessions and marketing arrangements (supply management) have a similar income effect to the direct government payments of recent years.

3. Some of this support is provided to farmers in a way that it is rewarding them financially for some of the very practices that are causing or exacerbating the sector's environmental problems; rather than assisting to address them by favouring better alternatives.
4. A sustainable pattern of agricultural production would exist when:
 - a. Farmers' concerns regarding markets, capital investment and debt can be addressed by providing reasonable returns to their labour and investment, while at the same time:
 - b. They would ameliorate the environmental considerations listed above through:
 - the use of rotations, cover crops, companion plantings and cover crops on lands of sufficient soil quality and low susceptibility to erosion to protect soils and water with:
 - the maximum use of nutrient recycling, naturally occurring production of nutrients, energy and systems of pest control,
 - the minimum use of non-renewable energy and pollution from plant and animal wastes, and so as to:
 - maximize the compatibility of agriculture with the achievement of objectives for wildlife, natural areas, flora and genetic diversity.
5. A farming policy that would support these types of changes could not rely predominantly, as present policies largely do, on the maximization of farm incomes and product sales through economies of specialized production of a limited range of commodities. These economies would need to be supplemented with economies of complementary environmental relationships. It must be pointed out at this stage that farmers themselves, having always been dependent on and appreciated such complementary economies. They require a shift in the practice as opposed to rhetoric of government and in the setting of the management priorities of the sector as a whole. The issue is one of creating an economic framework for

farming which reflects the complementary relationships more directly and completely.

6. Recent technologies, as well as economic trends and the policies and programs of both senior levels of government have all worked together to set Ontario's farm sector off on a path of change quite different from that outlined in para. #4. In recent decades the land base remaining in farming has become smaller, but the area intensively used has not declined very significantly. Furthermore, the amount of chemicals and other inputs has been increasing, as well as the amount of food output. More is being gained from less natural resources, but not without considerable risk of over stressing the environment.
7. Existing policies have the following detrimental effects on the environment:
 - a. Farmers already in crop insurance and gross revenue stabilization programs are discouraged from changing from relatively high input and intensive revenue generating production systems to ones relying on lower inputs and more rotations.
 - b. Present income stabilization programs based on commodities and total levels of production amplify the impact of declines in market prices and the negative effects of weather events on yields if farmers move to reduce the intensity of their production compared to conventional production practices.
 - c. Current programs tend to provide decreased levels of income security when yields may be less variable, under less intensive and more environmentally benign production practices, compared to more intensive production systems. They also discourage farmers from producing non-marketed crops such as forages and green manures, and encourage a more intensive use per hectare of inputs such as fertilizers and pesticides than would otherwise be the case.
 - d. Subsidizing such inputs as fertilizers and pesticides through sales tax concessions not generally available to industry also encourages more intensive cultivation and the greater use of potentially environmentally damaging inputs. It is more desirable to offer farmers income support through programs directly stabilizing incomes than through reductions in the prices of energy-based inputs.
 - e. It may be advantageous to consider ways of reducing the costs of land relative to commodity prices. This would encourage the increased adoption of low tillage forms of crop production – lower tillage not only would reduce energy consumption, but reduce risks of soil and water degradation.
 - f. Other conclusions on the effects of policies are implied in the recommendations that immediately follow.

8. Recommendations:

- a. Introducing a non-commodity based program to stabilize net farm incomes or returns to replace the existing forms of commodity specific programs would provide equivalent levels of income protection for conservation practices as existing programs, based on commodities, provide for traditional practices. How the total public and private costs of stabilization programs would be affected by a move to a non-commodity basis is beyond the scope of this report. However, it should quickly be investigated using a full cost accounting approach.
- b. The key concern in order to maintain the economic attractiveness of reduced tillage practices, would seem to be to avoid a repeat of the situation of the early 1980's when commodity prices were high both absolutely and in relative terms compared to energy-based prices. Ensuring a higher real price for energy-based inputs may be a sufficient answer, but thought must be given to offsetting the negative impact of a considerable improvement in commodity prices from today's extremely depressed levels.

One method could be to introduce cross-compliance requirements into farm income support programs, requiring farmers to use low tillage methods. Another option would be to encourage the evolution of farm structures such that an operator's labour becomes the constraint determining farm operations. Some options which come to mind, not all of which are necessarily equitable, efficient or socially acceptable in today's circumstances, include:

- policies and programs to reduce the cost of additional land for farm production,
 - to tax farm income on a fixed, rather than increasing, percentage basis,
 - to regulate the sale of energy-based inputs, perhaps requiring them to be available only to farmers holding marketable purchase quotas originally issued free to farmers by the Province.
- c. The adoption of reduced tillage will also be encouraged by a growth in farm size. This is already occurring, but the Province should investigate whether this trend is being constrained by the current economic conditions, and by land prices in particular. There may be a case here for offering reduced rates of interest for credit used to set up larger farms using reduced tillage methods. It may also be possible to link this cheaper credit to the provision of other environmentally desirable practices, such as the provision of habitat for wildlife.
 - d. If it were decided to end tax concessions on their energy-based purchases, farmers could be provided with the same level of income support through a transfer of the revenues involved to cover premiums on a comprehensive income stabilization insurance program.

- e. The Province should conduct a careful and comprehensive review of supply management systems which includes environmental considerations.
- f. There is a need to deliver all farm programs according to ecological as well as market requirements. Improved standards for farm planning and evidence that farmers are managing their land use in an environmentally sensitive manner should be an important criteria to be eligible for a whole range of programs.
- g. The Province's farmers have already shown a very positive response to pesticide management training programs designed for farmers, and this experience should lead the Province to maintain the momentum by offering similar programs for the management of soil and water, and habitat resources. A number of other public and private agencies could be co-opted for this initiative, such as the Ontario ministry of Natural Resources for forestry holdings on farms and for wildlife habitat, and such agencies as the Ontario Federation of Anglers and Hunters and Ducks Unlimited.
- h. Should such educational programs prove successful, the Province would have strong grounds for insisting on adherence to environmental guidelines as a condition for eligibility in all programs. It would not be necessary for the Government to write the guidelines independently. They would be more effective if they were written by representative farmers in consultation with academics, representatives of other interests in the countryside as well as governments. Since these guidelines would have to be sensitive to local conditions, they would require considerable local input. The Province should build upon the apparently successful experience of using farmers through Soil and Crop Improvement Associations to deliver the Land Stewardship Programs, and promote the continued development and participation of such groups in initiatives to improve the standards of management of the environment.
- i. A new set of objectives are required to guide the setting of federal and provincial policies and programs for Ontario's farm sector. The various policy review consultative exercises instigated by the Federal Department of Agriculture, following publication of a new federal position on agriculture policy (Agriculture Canada, 1989), can form the basis of many of the changes that are required.

Earlier this year the Ontario Ministry of Agriculture and Food established an Environmental Responsibility Team. Although its report stresses the need to involve stakeholders in all facets of OMAF's work, the participation of non-agricultural stakeholders appears to be limited to that which will flow through inter-departmental meetings of senior officials. This seems inadequate if a spirit of cooperation between all stakeholders over natural resources is to be promoted. The management of natural resources is not something that can be implemented centrally – the mixes of issues are geographically very volatile.

and some decentralized, multi-stake holder consultative and delivery process must be developed.

The new programs being considered by OMAF, such as those under 'Project Green Farm', tend to be incremental, subsidy and research/promotion exercises, and proposals for adjusting existing policies and the development of economic development strategies for the sector with environmental concerns as an equal consideration to support for marketing and farm income seems to lack any conviction and direction.

The Province should review its priorities in the light not only of this report, but the conclusions of many of the working groups set up under the Policy Review initiated by the Federal Minister of Agriculture.

- k. The Province needs to develop a system to monitor the impact of farming on the environment, covering all the facets of the issue as discussed in this report.

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